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ABSTRACT

This book, which is intended for educators who are invited into workplaces to design, develop, and deliver workplace literacy and other training programs and for corporate and labor leaders involved in workplace education, examines the concepts of total quality and bedrock (foundation or basic) skills. Presented first are a glossary and introduction describing the linkages between bedrock skills and total quality. The following are among the topics discussed in the book's seven chapters: defining "total quality" (its place in the development of organization theory, link to bedrock skills, and integration into literacy task analysis; keys to its effectiveness); understanding the labor perspective (union resistance, other dissenting voices, factoring in positive views); integrating bedrock skills into technical training (reasons for collaborating, use of the integrative partnership model, requirements for success); statistical process control and the quality tools (using the tools to promote holistic learning, using real life to clarify statistical concepts); adding International Standards Organization standards; applying total quality in corporations and elsewhere (focused factories, total quality in education; hoshin--a Japanese planning model); and assembling the bedrock/quality toolbox. Eleven endnotes are listed. Appended are an education profile of St. Lawrence College (Ontario) and its improvement efforts and a structured job analysis interview. (MN)

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QUICKSANDS !

Sidestepping the Quality Quicksands
Setting Continuous Improvement on Bedrock

WARNING!!

1. **There are quicksands out there ready to swallow up your "total quality" initiatives.**

2. **Find out how to use "bedrock skills development" to sidestep the quality quicksands.**

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GLOSSARY
SOME IMPORTANT TERMS

Basic Skills

See **bedrock skills**. Both terms are used in this text interchangeably.

Bedrock Skills

The term **bedrock skills** encompasses the foundation skills upon which technical skills are added to create a comprehensive range of workplace skills and competencies. These foundation skills include:

- reading and writing (often termed literacy);
- numeracy;
- oral communication;
- computer skills; and
- thinking skills (problem solving, decision making, planning/organizing).

Bedrock skills are essential skills. They are basic skills cast in a new light. The term "bedrock" gives emphasis and recognition to the *strength* of the foundation on which all other skills are layered.

Bedrock Quality Toolbox

The Bedrock Quality Toolbox is the assortment of techniques and methods which can be used by learning professionals to ensure that bedrock skills are considered when building Total Quality approaches to learning.

Common Cause and Special Cause

Common cause refers to natural variation in output caused by the operation of a process, while **special cause** refers to variation caused by some special, rare, outlying event such as a machine breakdown or a short circuit in electrical equipment.

Continuous Improvement

See **Total Quality**. While purists in the field do not see Total Quality and Continuous Improvement as synonomous terms, they are generally perceived as being similar. It should be noted that Dr. W. Edwards Deming, the continuous improvement guru, avoided the term Total Quality.

Corporate Learning Pyramid

The **corporate learning pyramid** is a representation which depicts various layers of workplace learning. It ranges from **bedrock skills** at the base of the pyramid to **vision skills** at the pinnacle. At intermediate points, are other core skill areas which are essential in the workplace. These include:

- technical skills;
- continuous improvement;
- customer service;
- project management;

- team work;
- systems thinking, and
- leadership.

- While bedrock and vision skills form the foundation and the apex, the skills which come in between may vary depending on the organization's purpose and mandate.

Customer

In Total Quality parlance, the **customer** is a person or group inside or outside your organization who is the receiver or beneficiary of your product or services. While the word **client** is sometimes used, the word **customer** is more current.

Hoshin

Hoshin is a strategic planning model also known as Management by Planning (MBP). It focuses on process improvement outcomes rather than on results oriented outcomes.

Learning Professionals

Learning professionals come in several categories. One category is the **workplace educator**, often from outside the organization, who is invited into a workplace to provide skills enhancement or upgrading. Usually this person has expertise in adult learning theory and practice and comes from a community college, board of education, or community service organization. Some organizations have their own in-house adult education specialists, often located in a training department. They are often called **learning consultants**.

Quality Professionals:

Many organizations have hired **facilitators** to assist with continuous improvement implementation. A facilitator is an employee trained in the dynamics of team building and continuous quality (process) improvement who assists in the implementation of Quality initiatives through animation of work teams and monitoring of process improvements. A skilled facilitator, though usually not from an adult education background, is a key promoter of workplace learning and development.

ISO 9000

"ISO" is the International Standards Organization. ISO 9000 is a series of quality standards which, when met, can lead to certification. The standards relate to process rather than product quality. There are also standards known as 9001, 9002, 9003, 14001 and others developed for specific industries.

Kaizen

Kaizen is the Japanese word for "Continuous Improvement".

PDSA Cycle

The PDSA cycle, first developed by Dr. Walter A. Shewhart and later expanded by Dr. W. Edwards Deming, stands for Plan, Do, Study, Act. It is sometimes presented as PDCA - Plan, Do, Check, Act. The cycle is a methodology for undertaking continuous process improvement by starting with a small test, validating it, and expanding it. The PDSA Cycle is an important cog in the wheel of Quality Management.

Literacy Task Analysis

Literacy Task Analysis, often known by the initials LTA, is a process which can be used to determine the bedrock skills found within jobs. These skills include reading, writing, math, communication, problem solving and team work.

Statistical Process Control

Statistical Process Control is the analysis of a process through the use of statistical techniques which indicate whether the process is operating within appropriate control limits.

Systems Thinking

Systems thinking is a paradigm which focuses on the whole rather than on parts. If you are a systems thinker, you will want to know what is happening across the whole organization and how it affects you, rather than focusing on your own small area such as Purchasing or Advertising.

Total Quality

Total Quality is a philosophy of management based on continuous improvement of processes. Also known by the names Total Quality Management, Continuous Quality Improvement and Continuous Process Improvement. It has been defined as "involvement of everyone in continuous improvement of systems to produce products and services which result in customer satisfaction and loyalty now and in the future."

Value-Added and Non-Value Added

These terms are used to describe processes. Value-added processes add direct value to outputs. Non-value-added processes are those which add cost without adding value. For example, a correspondence routing process which calls for signature sign-offs of too many people could be referred to as being non-value-added, or NVA. It adds cost through time delays and person hours while not adding value to the end product.

Variation

Variation refers to changes or divergences which take place in a process. Variation is natural when changes occur within a stable process. For example, even if a machine makes more products one day than another, this variation may occur within acceptable control limits in terms of the capabilities of the process. This is variation by **common cause.** Variation also occurs by **special cause.** (See Common Cause and Special Cause.)

Work Teams

Cross-Functional: Cross-functional work teams are teams in which team membership extends across organizational units. The team will include employees from various parts of the organization - e.g. - from Production, Human Resources, Marketing, Research. Each person brings to the team perspectives from hid organizational grouping.

Self-Directed: Self-directed work teams are teams in which members have been empowered to make decisions within limits set at the time the team is established. These teams may be made up of persons from one unit, or may include representation from a broader area.

TABLE OF CONTENTS

Glossary i

Acknowledgement viii

On the Importance of Learning ix

Introduction X

About This Book x

Integrating Diverse Fields x

The "20 Percent" Mystery x

Sidestepping the Quality Quicksand - Choosing Firm Ground xi

The *Learning Pyramid* - From Bedrock to Pinnacle xi

An Accidental Beginning xiii

The Learning Link xv

A Philosophy of Learning xv

Illuminating the Road to Continuous Quality Improvement xvi

CHAPTER 1 - Total Quality - What Is it? 1

More Than a Style of Management 1

A Powerful Formula - Dr. Deming's 14 Points 1

Total Quality's Place in the Development of Organization Theory 3

The Search for Historical Perspective 3

From Frederick Taylor and Scientific Management 3

to Today 4

Quality's Antecedents - An Evolutionary Process 4

Kaizen - Continuous Improvement, Japanese style 4

Who Regulates Quality? 5

Did this Chick really come from that Egg? 5

Understanding and Accepting the Continuum 6

Where to Begin? 6

The Mission Statement and the Vision Statement - Viewing the Present and

Anticipating the Future 6

What Business Are We In? 7

Making the Link to Bedrock Skills 8

Establishing a Context - an Array of Approaches to Workplace Bedrock Skills . 8

A TQ Partisan Meets a Skeptic 9

Integrating TQ into Literacy Task Analysis (LTA) 12

Relevance of Literacy Task Analysis to Total Quality 13

What Makes Total Quality Tick? 14

1. Focus on the Customer 15

2. A Systems Approach 18
3. A Long Term Relationship with Suppliers 21
4. Enlarged Communication/Dialogue - Employee Involvement in Continuous Problem Solving and Decision Making 22
5. Understanding of Variation - Processes in Statistical Control 23
6. Replacement of Numerical Goals by Methods to Improve the Process 26
7. Abolition of Merit Pay and Performance Evaluation 28
8. Adoption of the PDSA Cycle 30
9. Elimination of Non-Value-Added Parts of Processes 32
10. Emphasis on Training and Education 33
11. Replacement of Competition by Cooperation 34

CHAPTER 2 - Understanding The Labour Perspective 37
Union Resistance 37
Other Dissenting Voices 41
Factoring in Positive Views 41

CHAPTER 3 - Integrating Bedrock Skills Into Technical Training - The Tq Connection 43
An Elusive Wish 43
Why Collaborate? 44
Making it Happen 44
(a) Simplify workplace documents. 44
(b) Demystify Workplace Terminology 45
(c) Show How to Read for a Purpose 46
Characteristics of Good Readers 47
(d) Help Workers Use Context Clues to Meaning 47
(e) Highlight Strategies for following directions 48
Using the Integrative Partnership Model 48
Requirements for Success 49

CHAPTER 4 - Statistical Process Control (Spc) And The Quality Tools 51
Introducing the "Quality" Tools 51
Using the Tools to Promote Holistic Learning 51
The Tools In Brief 52
Which Tools to Use? 54
Using Real Life to Clarify Statistical Concepts 54

CHAPTER 5 - Adding ISO (International Standards Organization) 57
Making Sense of ISO 57
What is the purpose of the standards? 59
An expert's view of ISO 60
Some Questions and Answers About ISO 9000 60

CHAPTER 6 - Corporate And Non-corporate Applications Of Total Quality 63
John Deere and the Focused Factory 63
What is a *Focused Factory*? 64
What is the *Cellular* Approach? 64
Bedrock Skills in the Focused Factory 65
The Red Schoolhouse - Total Quality in Education 66
Perusing the Research 68
The Health Care Sector 69
The Notion of Hoshin 71

CHAPTER 7 - Assembling The Bedrock/quality Toolbox 75
What's in the toolbox? 76
Championing The Learning Link - A Multi-pronged Process To Ensure The Success
Of Your Quality Transformation 79
If You Are The CEO 79
If You Are The Union Rep Or Front Line Worker Spokesperson 80
If You Are A Learning Professional 82

Appendix I An Education Profile - St. Lawrence College 84

Appendix II Structured Job Analysis Interview 114

Acknowledgement:

The inspiration for this book came from several sources.

***W. Edwards Deming**, statistician, and management guru. In his 92nd year of life he was able to impart his wisdom at his 4 day seminar on Quality, Productivity and Competitive Position in Dallas, Texas.*

***Betty Cunningham**, Quality Arkansas. A chance meeting with Betty set me on the path to seek Dr. Deming.*

***Dr. Thelma Barer-Stein**, President, Culture Concepts, Inc., Toronto. Thelma's encouragement, as well as her many valuable suggestions regarding content and terminology, were of great assistance to me in crafting this manuscript.*

On the Importance of Learning:

"The best thing for being sad", replied Merlin, beginning to puff and blow, "is to learn something. That is the only thing that never fails. You may grow old and trembling in your anatomies; you may lie awake at night listening to the disorder of your veins; you may miss your only love; you may see the world about you devastated by evil lunatics, or know your honour trampled in the sewers of baser minds. There is only one thing for it then - to learn. Learn why the world wags and what wags it. That is the only thing that the mind can never exhaust, never alienate, never be tortured by, never fear or distrust, and never dream of regretting. Learning is the thing for you. Look at what a lot of things there are to learn - pure science, the only purity there is. You can learn astronomy in a lifetime, natural history in three, literature in six. And then, after you have exhausted a million lifetimes in biology and medicine and theocritism and geography and history and economics, why, you can start to make a cartwheel out of the appropriate wood, or spend fifty years learning to begin to learn to beat your adversary at fencing. After that you can start again on mathematics until it is time to learn to plough."

Terrence White, The Once and Future King

INTRODUCTION

ABOUT THIS BOOK

This book is about Total Quality and bedrock skills. It has a broad readership in mind - ranging from corporate and labour leadership to workplace educators, trainers and facilitators. In a sense, this book has been conceived on shifting sand. When I first started to write it I had one particular group especially in mind - outside adult educators or service providers who are invited into workplaces to design, develop and deliver workplace literacy, numeracy and communications programs. By the time I was well into the manuscript, however, another group was coming to the fore - the internal "facilitators" in Total Quality workplaces who often bear the responsibility of coordinating and animating employee participation on teams.

Yet another group also came to mind - senior managers and even CEOs, those vital people who stimulate vision and exercise leadership within an organization. Without their clear understanding of the interface between bedrock skills and continuous improvement, even the most earnest and well conceived quality initiatives may be doomed. This book is therefore dedicated to all these groups. It is also dedicated, as every book on this subject should be, to the myriad of workers who form the backbone of any Total Quality implementation and to those who represent them through labour organizations.

Integrating Diverse Fields

There is some risk associated with writing a book intended for such a diverse group of readers. The greatest risk is boring one group with an over abundance of information which they already know, while providing inadequate background for a group with less grounding in certain areas of subject matter. I considered writing two books - one to be read by adult educators and the other to be read by business and labour people. I decided against that approach, however, for one good reason. It would further bifurcate what is already a badly-split field of knowledge. In brief, it is necessary to reach out to several groups simultaneously if an integrated picture is to be drawn for the reader.

I hope that readers already familiar with large chunks of the content will find it an interesting review, and that it will be made worthwhile by finding new points to ponder.

The "20 Percent" Mystery

Business leaders should not assume that because educators and trainers are a prime target of this book it does not pertain to them. One bold question presents itself. *What is the missing key to the so-called "20 percent" mystery?* This mystery is based on the fact that only an estimated 20 per cent of Total Quality programs are considered to be successful. Could it be that bedrock skills development is that missing key? And if so, what is it that *all* stakeholders in Quality must know about these skills if the key is to be used to unlock potential rather than lock it in?

A great deal has been written about bedrock skills, often under the rubric of words like "basic skills", "essential skills", "literacy", "numeracy", or "communications skills" - and it would take several convoys of container trucks to hold even half of what has been written about Total Quality. Yet, while there is general agreement that sound foundation skills underlie the success of Total Quality implementation, most literature on Total Quality and training tend to emphasize training in Total Quality itself rather than in the pre-existing bedrock skills and knowledge on which Total Quality, as well as other forms of learning, is built. This book, then, aims to fill a gap in the literature by providing an in-depth view of the linkages between bedrock skills and Total Quality.

Sidestepping the Quality Quicksand - Choosing Firm Ground

> *There are many kinds of soil - ranging from bedrock to quicksand. A structure built on bedrock has an excellent chance of survival. A structure built on quicksand may be gone in the time that it takes to hiccup.*

The analogy may be carried to the implementation of Total Quality initiatives within organizations. These initiatives do not hover in mid air. They must be rooted on a solid foundation - on bedrock skills which will provide security and stability. If organizations do not pay attention to the bedrock skills, they may find all important initiatives mired in the all too familiar quicksand.

> Starkly stated, if employees are lacking in their bedrock skill base, they will be unable to contribute to higher level activities within the organization.

Support for the importance of bedrock skills as the foundation for the development of all other skills has been suggested in an article on Self-directed Work teams by Mohawk College professors, Michael Piczak and Reuben Z. Hauser. Writing in *Quality Progress*, they rated the order of training priority for various skills - technical, interpersonal, administrative, problem solving, quality management, productivity improvement and literacy/numeracy. Literacy and numeracy - with the core elements of our bedrock skills category - ranked number one, even ahead of the much vaunted technical skills area.

The *Learning Pyramid* - From Bedrock to Pinnacle

Most fields of learning are illuminated by the use of relevant analogies. Understanding the link between bedrock skills and continuous quality improvement is no exception. The pyramid, that noble symbol of power and mystery, has often been used to explain relationships of seemingly disparate elements. It seems appropriate here.

Those of you who have travelled up the long ramp to the interior of the Great Pyramid of Cheops will think of the simplicity of the structure - from the broad base to the narrow, distant pinnacle. They will also think of the vast interior space of the structure - so vast and self-contained that it is, indeed, far from simple. They will think of what makes the whole structure architecturally possible - the strength of the foundation.

Think about that for a moment, and carry that thought through to the area of skills acquisition and development.

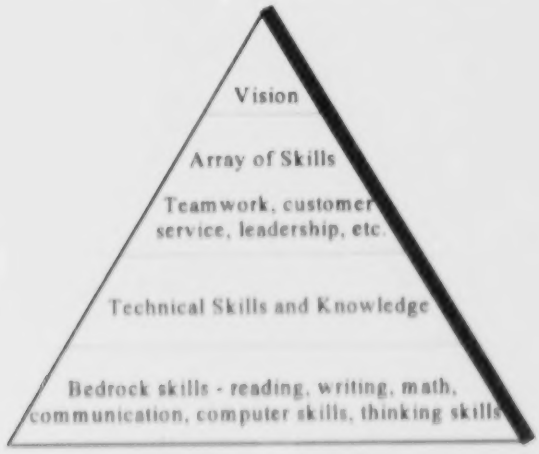
> Let's call the foundation **bedrock** and let's call **bedrock skills** those fundamental skills of reading, writing, math, oral communication, teamwork, computer skills and thinking skills.

Those skills are sometimes refered to as basic skills - but the word "basic" does not connote the element of strength which is necessary if we are to view these skills in a new way, with a heightened awareness of their relevance and importance. So - let's put bedrock skills at the base of our pyramid. Without this foundation the pyramid will crumble.

Now let's layer technical skills on top of the bedrock skills. Technical skills surely make the difference between a successful organization and an unsuccessful one. Much time is spent in analysing technical competencies and finding people who will meet them. However, technical skills do not exist in a vacuum. If they are not firmly linked to foundation skills they may be somewhat shaky. The interior of the pyramid as it narrows is filled with an array of skills each of which is essential in today's workplaces. This includes skills in the areas of teamwork, customer service, networking, project management, continuous improvement, systems thinking, and leadership. These are all important skills but they are not disembodied. An employee uses his bedrock skills and his technical competence as the backdrop for utilizing these other skills. In other words, if he has low reading and writing skills and a limited technical competence in his field, it probably doesn't matter if he knows all there is to know about continuous improvement or teamwork. His knowledge of those areas would lack a context in which to apply them. Bedrock skills, together with technical skills, provide a framework for applying the more diverse skillsets which are important to every workplace, and which fill the interior space of our pyramid.

Saved for the apex is **vision**. Just as the pyramid would crumble without its strong foundation, it would be incomplete without a crowning point - a pinnacle. Vision can be seen as that pinnacle, since without vision towards the future, the pyramid will also crumble.

Let's look at *the learning pyramid* from the ground up.


Vision
Array of Skills
Teamwork, customer service, leadership, etc.
Technical Skills and Knowledge
Bedrock skills - reading, writing, math, communication, computer skills, thinking skills

When bedrock skills are strong, all other skill-sets sit easily on the base. When the bedrock is weak, the other skill-sets are swallowed up by quicksand - even disappearing without a trace. Just think about it - how can an organization have an effective quality initiative if employees lack the underpinnings which will lead to development of various skills in tandem?

An Accidental Beginning

I first became interested in Total Quality by accident when I was invited by Brenda Bell, then of the National Alliance of Business (NAB) in Washington, to speak at their National Conference in Miami in September, 1992. I had heard very little about the Total Quality movement at that time. Nevertheless, my exposure to workplace skills issues had caused me to give a great deal of thought to the question, "What makes up a training culture?". I later found out that the elements I had identified all fit squarely under the Total Quality umbrella.

There were many aspects of the Miami conference which stimulated my interest in Total Quality. These include remarks in the plenary by NAB's President Kolberg, additional points by Robert Reisch, later to become Secretary of Labour in the Clinton administration, and the good luck to sit beside an enthusiastic Total Quality devotee at one of the conference's luncheons. This person was Betty Cunningham, a key member of the *Quality Arkansas* staff.

The aim of *Quality Arkansas* is to help Arkansas businesses and communities develop a common awareness and understanding of the potential for increasing productivity and improving the quality of life through the discipline of Total Quality.

> Within this framework, Total Quality is described as "involvement of everyone in continuous improvement of systems to produce products and services which result in customer satisfaction and loyalty now and in the future." (1)

At the time of the conference, George Bush was still President and from a Canadian perspective seemed poised for re-election. Until then, I hadn't heard much about Bill Clinton, but from Betty Cunningham, whose office is a stone's throw from the Governor's Mansion in Little Rock, I heard positive comments about the Arkansas Governor and his devotion to Total Quality. I also heard glowing reports of the work of W. Edwards Deming, major guru of the Total Quality movement. His work on Continuous Improvement began in Japan in the 1950s and only began to gain popularity in North America in the late 1970's. By the early 90's, one could say that it was an idea whose time had come. I realized that what I was hearing at the NAB conference from Betty and others who had studied under Deming was not a fly-by-night passing comet but a fully functioning star - and I wanted to enter its path of light. I wanted to learn more.

I must admit that I was rather embarrassed to consider that I was such a neophyte to the concepts presented at the NAB conference. It was almost frightening to consider that a great many of my colleagues in government and education were also generally unfamiliar with the concepts and their relevance to workplace education. It suggested to me that some oft quoted words of Virginia Woolf were paramount - "Always connect".

My search for enlightenment began with reading Deming's *Out of the Crisis* in the latter part of 1992 and progressed to actually attending two Deming seminars in 1993. The first was in Dallas, Texas in May. Knowing that W. Edwards Deming was in his 92nd year, I did not expect that he would personally "do" the seminar - but indeed he did, with only peripheral and sporadic help from a caring staff.

My second Deming seminar took place in Costa Mesa, California in September, 1993. I already had absorbed the main elements of the Continuous Improvement philosophy in Dallas, including the 14 Points and the Seven Deadly Diseases. Now I was ready for implementation information. Brian Joiner, Heero Hacquebord and Peter Scholtes were among the experts who assisted Dr. Deming at the September seminar. Concepts such as "value-added and non-value-added", and the Plan, Do Study, Act (PDSA) or Shewhart Cycle were among the topics addressed. I was dismayed to note that Dr. Deming's health had noticeably declined in the four months since I had last seen him and I wondered at his continued stamina and drive in the face of medical problems. Dr. Deming died at his Washington home in December, 1993, two months after his 93rd birthday. How sad I was to learn of his passing, and how grateful that I had had the opportunity to learn from this extraordinary man in that precious last year of his productive life.

> What was truly amazing about Dr. Deming was the way in which he overturned and challenged all the assumptions that shape our lives. He revered learning and invited us to discard the stereotypes which shape our thinking.

Dr. Deming was a systems thinker, a statistical thinker, and a philosopher and psychologist all in one. "Learning is terrifying", he was prone to intone, "but it's fun." Every once in a while he would pause, look over his glasses, and ask in a deep voice - "Are we having fun yet?" (We were.)

The Learning Link

When I look at Total Quality as it has evolved from the original Continuous Improvement work, I become aware of the way in which Total Quality merges the areas of Organizational Analysis and Learning. And, of course, learning involves the skills of reading, writing, listening, problem solving and reflection - skills which have been at the core of Bedrock Skills Training.

Surely it is interesting to reflect that it is only a scant five centuries ago, a blink in the eye of Time, that the first printed book was published in the English language - Caxton's own translation of The Recuyyell of the Histories of Troy. When one of the 18 surviving copies was sold at Christies, the noted auction house, earlier this decade, it fetched in the neighbourhood of 2 million dollars. But what makes this 1473 book particularly valuable beyond its excellent condition, is Caxton's postscript which reads that the copies are "not written with pen and ink as other books, so that every man may have them at once." Surely this constitutes one of the early examples of Continuous Improvement and Innovation - one which would transform the world. And, just as certainly, it is a precursor of learning leaving the cloistered domains of the monasteries and early universities and entering the world of the populace at large.

> The Learning Link takes Total Quality beyond organizational development, statistical process control, team building, value-added analysis and the many other descriptors of its main elements. It strikes right at the heart of thinking - that is to say, learning.

That is why, as Peter Senge tells us in The Fifth Discipline, a systems organization is a learning organization.

A Philosophy of Learning

I sometimes wonder why it is that, while we are all learners, we rarely pause to think about what learning is and the role that it plays in our lives. Probably Terrence White expressed the importance of learning as finely as has anyone in *The Once and Future King*. That's why I chose his quote at the beginning of this book. What an inspiring message! What makes it inspiring is the way in which all the knowledge outlined entwines and intersects.

Merlin's view of learning is a systems view of learning - one based on the premise that no single discipline is enough. That is the view, too, of the Total Quality philosophy.

> According to the Total Quality philosophy, no one view suffices. The perception of the machine operator is equally important to the success of the company as the view of the Senior Vice President.

It is probably that eclecticism of Total Quality which draws me to it. Indeed, I see Total Quality as a philosophy of learning every bit as much as a philosophy of management. That is why the place of bedrock skills such as problem solving and communicating is so relevant.

It goes without saying that any philosophy has its detractors as well as its aficionados. Total Quality certainly has both - to the extent that even the name Total Quality has come under fire as being too vague or too discredited. I must admit that the term Continuous Quality Improvement is closer to the movement's roots and is more descriptive. In view of the broad currency of both terms, I tend to use them interchangeably - "Total Quality" because of the economy of its five syllables (as opposed to 10 for its alternative), and Continuous Quality Improvement because of its greater conceptual clarity. Some people avoid both terms and choose to speak of "high performance workplaces".

Every book is written with a point of view. This book, while admittedly having a bias in favour of Total Quality, will examine the down side of Total Quality as well. In the true spirit of Peter Senge's "dialogue" rather than "discussion", every effort will be made to get to the roots of dissenting voices - all within the framework of studying the ways in which learning and bedrock skills enhancement shape the world of work in this new environment.

Illuminating the Road to Continuous Quality Improvement

Many people have thought carefully about the characteristics required in a Quality workplace.

> "Learning" is often mentioned as a requirement of the Total Quality workplace, although usually within the context of serving organizational needs, through training or group problem solving. This book takes the concept one point further, by focusing on individual learning needs as well as corporate ones. It takes the view that attention to bedrock skills needs is essential if individuals are to be empowered to seek lifelong learning opportunities in the workplace and in the community.

Companies may fear that devoting time and resources to these needs will detract from the larger corporate goals. However, without attending to fundamental bedrock skills , workers may lack the capacity to participate fully in the kinds of training which the organization regards as valuable. Continuous improvement simply does not exist outside of the context of continuous learning.

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CHAPTER 1 - TOTAL QUALITY - WHAT IS IT?

More Than a Style of Management....

"Total Quality" is much more than a style of management, although the well known phrase often carries the word "management" in tow. That is because Total Quality is an identifiable management style and management philosophy. However, since Total Quality often includes aspects which are psychological and philosophical rather than simply managerial , I generally prefer to drop the word "management" except when I am specifically addressing the management aspects of Total Quality.

> The Total Quality concept embeds a comprehensive and multi-faceted philosophy - a philosophy which, when espoused, becomes a veritable new paradigm, a new way of looking at the world.

In Total Quality circles the word "transformation" is often heard. The Greek word "metanoia" has been used as well. This Greek word includes the meaning of reorientation of one's way of life and spiritual conversion. One must use this word carefully, of course. At the Dallas Deming seminar I attended in which metanoia was mentioned, I was reduced to silent chuckles when a participant asked for clarification of the concept of "melanoma". Suddenly the concept resembled a cancer! Greek precision aside, the word "transformation" is most often used.

Total Quality had its origins in post-war Japan when Dr. W. Edwards Deming, an American statistician, gave a series of lectures to Japanese industrial leaders as part of General MacArthur's reconstruction initiative. Prior to the war, Japanese products were often seen as shoddy and inferior. By 1945, however, with their land laid waste and their Emperor reduced to a mere mortal, Japanese manufacturers and business leaders were looking for a new way of doing things. They realized that rebuilding the economy had to go beyond simply recreating the pre-war situation. They had to be able to compete with the powerful victors. Dr. Deming, with his focus on continuous improvement and customer satisfaction, gave them both a vision and a plan.

Dr. Joseph Juran, another American, added his expertise to that of Dr. Deming, presenting and building upon the same philosophy. Together these two experts became the gurus of what was to become the Total Quality Movement.

The core of Total Quality is found in Dr. Deming's 14 points. These 14 points have, perhaps, become better known than that other famous set of 14 points - those presented by President Woodrow Wilson at the end of World War 1 dealing with post-war reconstruction. Despite the differences in their backgrounds and purposes, there is a similarity between the 2 sets of 14 points. Total Quality also deals with reconstruction - in this case, the building or rebuilding of almost any organization or business structure.

A Powerful Formula - Dr. Deming's 14 Points

It is difficult to state in a few words the essence of the 14 Points. If I were to try to do so, however, I would express it as an endorsement of "systems" thinking, a focus on empowered

employees, and the building of trust between and among everyone in the system, including suppliers and customers as well as workers and managers. Quite a powerful formula!

> The success of the 14 Points may lie in their attack on traditional values in management. Performance evaluations, merit pay and management by objectives exemplify management as it has been practised in the Western world for a good many years.

Work standards, quotas, exhortations toward defect reduction and mass inspection have become watchwords of how to do business. The assault on traditional values presented in the 14 points is thus massive and frontal. Probably the only reason why such an attack has been successful is that Western management has come to the realization that the old way of doing things no longer works. Just as the Japanese were ready to listen in the 1940s, the Western democracies were increasingly ready to listen from the 1970's onward.

When one reads Dr. Deming's 14 points in their crispness and abruptness, one can almost hear the words coming from the mouth of the famed guru. Here they are, as outlined in Dr. Deming's classic, *Out of the Crisis*.

1.	*Create constancy of purpose toward improvement of product and service, with the aim to become competitive and to stay in business, and to provide jobs.*
2.	*Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.*
3.	*Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.*
4.	*End the practice of awarding business on the basis of price tag. Instead, minimize total cost. Move toward a single supplier for any one item, on a long term relationship of loyalty and trust.*
5.	*Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs.*
6.	*Institute training on the job.*
7.	*Institute leadership. The aim of supervision should be to help people and machines and gadgets to do a better job. Supervision of management is in need of overhaul, as well as supervision of production workers.*
8.	*Drive out fear, so that everyone may work effectively for the company.*
9.	*Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with the product or service.*
10.	*Eliminate slogans, exhortations and targets for the workforce asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the work force.*
11a.	*Eliminate work standards (quotas) on the factory floor. Substitute leadership.*
11b.	*Eliminate management by objective. Eliminate management by numbers, numerical goals. Substitute leadership.*
12a.	*Remove barriers that rob people in management and in engineering of their right to pride of workmanship. This means inter alia, abolishment of the annual or merit rating and of management by objective.*
13.	*Institute a vigorous program of education and self improvement.*
14.	*Put everyone in the company to work to accomplish the transformation. The transformation is everybody's job.*

Total Quality's Place in the Development of Organization Theory

The Search for Historical Perspective

The trouble with living in the present (the only place we can live) is that we are often so close to events that we cannot view them with historical accuracy. The benefit of hind sight has been much extolled. We probably can, however, with some element of precision look at Total Quality as a step along the continuum in post-Industrial revolution industrial development.

From Frederick Taylor and Scientific Management.....

It is very popular today to denigrate Frederick Taylor, the father of Scientific Management. According to Taylor's Scientific Management theory, which dominated the latter part of the last century and the first part of this, work is divided into many tasks and subtasks, with workers specializing on one or few parts of the work. Efficiency is predicated upon speed and accuracy built up through the carrying out of repetitive tasks. Workers have little or no control over the larger workplace scenario and are not encouraged to see the operation beyond the domain of their small part within it.

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.... to Today

It is clear that this approach is too restrictive for today's workers. With a more highly educated workforce and a burgeoning respect for democracy and individual freedoms, Scientific Management was doomed to failure. That does not mean, however, that it did not serve its purpose in a very different era, when there was in general an undereducated mass of workers, basic machinery built along mechanical rather than computer-based and electronic principles, and a sudden and dramatic move from an agriculture based economy to one based on manufacturing. Our own era, in contrast to Taylor's, is dominated by the decline of manufacturing, the rise of service industries and information technologies, and the growth of popular education.

The interaction between these factors has created its own problems: a low wage economy and a poor fit between education attained and skills required. It is not unusual today to see university graduates washing floors and serving in restaurants, while some higher level jobs go unfilled due to lack of specifically trained candidates.

Quality's Antecedents - An Evolutionary Process

> While many Quality devotees do not like to admit it, there is some credibility in thinking that the Quality movement actually has its origins in Scientific Management.

Texan professor, David W. Hays, explains:

> *"QI (quality improvement) and scientific management both state their goals in strikingly similar language. As explained by (Frank) Gilbreth (of the Scientific Management school, circa 1920's), "For its objects, scientific management has the saving of energy, materials or time, or in other words, the elimination of waste and the increase of the world's wealth resulting from greater productivity of men and machinery." Gilbreth went on to say, "Errors are prevented instead of being corrected." This concept is identical to QI guiding principles, which state that quality comes from improvement of the process, not from inspection."*

While there is indeed a similarity in the descriptions, Total Quality's main departure point from Scientific Management is a humanistic one. Putting responsibility with the person doing the job entails trust and the willingness to train workers so that they *can and want* to take responsibility.

Kaizen - Continuous Improvement, Japanese style

Both the humanistic aspect of Total Quality and the link with Scientific Management is explored by Raymond Cheser (*Quality Progress*, April, 1994). Cheser's article is about "Kaizen" - the Japanese word for Continuous Improvement. He sees the Japanese concept as bridging scientific and humanistic management philosophies.

> *"Although Taylor's scientific management approach gained worldwide attention and was broadly adopted, it was perceived by*

many as inhumane. A closer reading of his book, Principles of Scientific Management, gives a mixed picture of Taylor's attitudes toward the worker. Although condescending, he clearly admired the working person and undoubtedly intended his system to mutually benefit both employer and employee. His work standards were, however, set by standards departments with no input from the worker.

Kaizen, on the other hand, provides both the opportunity and the means by which workers can find better ways to do their jobs.....Academic programs in management continue to portray scientific management as an obsolete, anti-motivational style used by dictatorial, insensitive managers at the expense of the line worker. Placing quantitative tools, rooted in turn-of-the century Taylorism into the hands of the worker, however, is an act of true empowerment and has been described as creating an environment of continuous incremental learning that transforms every worker into an industrial engineer."

Who Regulates Quality?

Many workers may see the transformation described as overstated; nevertheless, the regulation of quality by line workers rather than by quality control departments is a significant departure from Scientific Management theory. At the Deming Seminar I attended, Dr. Deming asked, "How many of you are from Quality Control Departments?" Several hands went up. After a contemplative and pregnant pause, the guru said, "You shouldn't exist."

Did this Chick really come from that Egg?

Even as I write, a pigeon is setting up a nest on my balcony. In a week or two, I expect to see several pigeon chicks emerge. I know they will be pigeons - not sparrows and not hawks. A species breeds its own kind - and when it does not, that is an occasion for surprise. Is that why so many people are surprised to see that TQ has emerged from Scientific Management? Does it seem that they are such different breeds that one could not possibly have led to the other?

It seems that once a movement has been discredited, there is an attempt to eradicate all its tenets, even those that made sense.

> Surely the fault of Scientific Management was not that it wanted to eliminate waste and increase productivity, but rather that the preciseness of its methods and its lack of flexibility were not sensitive to an increasingly democratic and educated society.

That eventually it no longer fit the times does not mean that it was 100 per cent misguided at the time it was developed.

What works for one era does not work for another, thus giving proof to Tennyson's verse,

"The old order changeth, giving place to new.
And God fulfills Himself in many ways
Lest one good custom should destroy the world."

Understanding and Accepting the Continuum

If we accept that there is indeed a continuum for organizational and management theory (along with a continuum for everything else) then we view Scientific Management and Total Quality not as "either/ ors" but rather as natural steps in an evolution which was destined to take place. Within this rubric, we see Total Quality as itself subject to replacement in the future as times and needs change. It would appear, however, that Total Quality may still be ascending toward its zenith. It certainly is too pervasive to be ignored - which really is the reason for this book - making sense of Total Quality within the parameters of one very specific aspect of the workplace - bedrock skills acquisition and their continuous enhancement.

Where to Begin?

The Mission Statement and the Vision Statement - Viewing the Present and Anticipating the Future

TQ companies are accustomed to talking in terms of mission statements and vision statements. There has been some confusion about these statements, and, indeed, some controversy about them. The two terms may appear to be synonymous but are not.

A mission statement will tell us what business we are in, whereas a vision statement will extrapolate the mission into the future.

Dr. Deming liked to use the example of the carburetor. Was the company in the business of making carburetors better and better? That may be the present mission - or is the company in the business of mixing fuel and air in a combustion chamber, inventing a method that will be better than using a carburetor, namely fuel injection? That is the vision - moving the company not just to a larger market share for an existing product but expanding the market with a new product or service.

Moving from Dr. Deming's example to my own, consider a cable company. Its mission or mandate is to provide information, education and entertainment services to Canadians using present technology. Its vision will go beyond this provision and will include a wide range of services along the electronic highway, ranging from interactive programming and home shopping to students' doing their geography homework through an electronic Internet visit to their counterparts in other countries. In other words, the vision statement anticipates the future - which quickly becomes the present.

Companies which are interested in obtaining a competitive advantage will probably have a vision statement. In a TQ company, employees may have a role in how that statement is developed. Almost everything which happens in a company will flow from the mission and vision statements. That is why it is important for all professionals offering services in a workplace to be

knowledgable of this area. The key elements of Total Quality will infuse the way mission and vision statements are interpreted.

As a matter of fact, many education institutions have adopted mission statements and, to a lesser degree, vision statements. These statements do not mean much, however, either in a business or an institution, if they do not leave the state of "words on a page" to become a firmly held guide which can be adhered to both as a philosophic statement and a focus for action. For them to do that, all employees must have been involved in the original thinking underlying the statements. A mission and vision statement written in the executive offices and distributed to employees on memos or business cards is not worth the paper it has consumed. Each employee needs to be part of the process.

What Business Are We In?

A key question to ask oneself is, "Is my mission statement relevant? Is it customer focused or turned inward to reflect my own needs as a professional." If it is the latter, no matter how worthy the professional goals, it is unlikely to be the beacon you need for lighting the path into the TQ workplace.

It is not just companies who need to ask themselves, "What business are we in?" Educators can do the same. If you see your business as a workplace educator to be, "providing to all learners the education and training that fulfills theirs needs as persons and as workers", then you will want to look to the workplace environment rather than to your own academic setting to structure your approaches to curriculum.

Some educators may reply,

> "This is not my mission. I am looking only at the needs of persons as individuals rather than as workers.."

To which the following comment comes to mind.

> "Then what you are doing is community literacy which happens to take place in a workplace setting - not workplace literacy."

I am not suggesting that the former is undesirable, only that its parameters as a distinctly different sort of training need to be recognized. It would be entirely reasonable, for example, for a Human Resources manager to ask potential service providers whether what they propose is indeed a "workplace literacy program" or a "community literacy program which happens to take place in the workplace". If it is the former, managers will expect to see content tied in some ways to the workplace content or the workplace culture. If workers have been struggling with the newness of statistical thinking or dreading working on teams because of lack of skills, they too will welcome a program which will assist in these very pragmatic ways.

In any case, doing some deep thinking about your mission and your vision will be helpful - and if your organization is remiss in this regard, some personal visioning may be in order. Steven Covey's, The Seven Habits of Highly Effective People , discusses this point.

Making the Link to Bedrock Skills

Establishing a Context - an Array of Approaches to Workplace Bedrock Skills

Total Quality approaches to workplace bedrock skills build on approaches which are already current - particularly functional context education. However, the functional context may not in itself be a valid descriptor of what is required in a high performance workplace.

American researcher Paul Jurmo has outlined three approaches to workplace education, all of which have their adherents and detractors.

1. *The General Approach:*
   General literacy programs are characterized by "the teaching of abstract de-contextualized skills traditionally done in formal schools...and divorced from real meaningful application with the hope that..somehow, someday the learners will be able to transfer those skills to real applications (Secretary's Commission on Achieving Necessary Skills, 1991)

2. *The Functional Context Approach:*
   The "functional context" approach argued that it is simply more efficient to teach people the skills they need to use on a day-to-day basis and then let them practice those skills in their day to day work (Sticht, 1987).

3. *The Collaborative Approach:*
   In the collaborative approach, workplace basic skills programs should "reinforce the critical thinking and teamwork required to transform workplaces into high-performance, continuous improvement organizations." (Imel and Kerka, 1992, Cited in Jurmo, 1994). According to the collaborative approach, such programs will change "not just the behaviour of individual employees but of the larger work organization as well."

All of these approaches have their limitations. The "general" approach is perceived as too decontextualized to provide for the diversity and complexity of workplace training needs, while the functional context approach is sometimes accused, either fairly or unfairly, of being too focused on Tayloristic minutiae.

The problem with the collaborative approach is that it is often not carried out. Many organizations in the process of transformation have assumed that the process itself will take care of skills upgrading - that no specific initiatives are required, or if they are, that the team facilitators will take care of it - which is not necessarily true if the facilitator has no training in bedrock skills issues.

There is another danger in the collaborative approach. If both organizational and individual needs are to be served by the initiative, how do you assure that each type of need is viewed equally? How does continuous *individual* improvement fare in an organization dedicated to continuous *process* improvement? Are the two goals compatible?

A TQ Partisan Meets a Skeptic

Some educators are so concentrated on the notion of *individual* improvement that they forget the realm of *process* improvement and its link to the organizational context. The following simulated conversation between two educators - one tied into the importance of organizational dynamics and the other not, tells a tale. This tale is, without doubt, told in thousands of workplaces.

Educator 1: "I just found out today that my college is going to be doing a workplace program at Ambidextrous Dynamics. That's really exciting."

Educator 2: "That is exciting. When are you starting?"

Ed. 1: "We start next week. The class is all assembled and ready to go. I'll go over a few days ahead of time and do a walk through and see the lay of the land."

Ed.2: "Aren't you doing a comprehensive Needs Assessment first?"

Ed.1: "Oh - that's already been done. An outside consultant did that. She was hired by my supervisor. She spent a couple of days over there interviewing managers, union types and even a few workers. She made up a report. I've got it right here in my briefcase."

Ed. 2: "So - does it give you all the detail you need? Do you get a pretty good idea of what kinds of jobs workers are doing and a bit of an idea on possible career paths?"

Ed. 1: "No - I can't say it does that. As a matter of fact, I'm not even sure of the whole product line. I think they make some kind of power tools - but I guess I'll find out when I get there."

Ed2: "Well - I guess the mission statement might tell you something. What does it say?"

Ed 1: "There doesn't seem to be one here."

Ed 2: "That's really odd - I've heard Ambidextrous is a Total Quality company. They should have a mission statement - even a vision statement. I wonder why that wasn't quoted at the start of the Needs Assessment report?"

Ed 1: "Oh - I'm not surprised it's not there - My supervisor thinks TQ is a fad. So does the consultant who did the needs assessment. She's not going to worry

about things like that. She'll ask the same questions for every company, traditional or otherwise."

Ed 2: "You mean she won't probe the system, identifying internal and external customers, and the like?"

Ed 1. "No - I don't expect so.....but why do you seem so surprised? We've done the Needs Assessment the way we always have - you know, probing the diversity and multiculturalism issues, finding out as much as possible about general education levels and requirements for staffing jobs. We've even selected a cross-section of volunteers and are ready to administer the TABE."

Ed 2: "The TABE? What will that tell you about learning in a specific working environment?"

Ed 1: "Not much, I agree - but it will give us a bit of an idea of approximate grade levels - and I have a grade 10 and a grade 11 math course all set to go once we decide on the levels. Also, some English language upgrading at about the grade 10 level which we can do in a computer assisted program."

Ed 2: "Do those courses cover statistical concepts, how to do control charts, how to do cause-and-effect diagrams, how to flow chart systems and processes, how to write up meetings or experiments? Does it deal with customer satisfaction, and how to use brainstorming and team building techniques?"

Ed1: "No. It's the general high school curriculum - nothing near as targeted as what you are talking about. Anyway - how would I know what they need? Maybe the students I'll have won't be involved in all those things. I guess I could always ask them - but I find that it's sometimes difficult to elicit that kind of detailed information."

Ed 2: "Well - a Literacy Task Analysis would give you a pretty good idea of the literacy and numeracy components within jobs - and a new LTA interview design has just come out adding questions which are particularly germane to Total Quality issues."

Ed 1: "When would I do that? The course begins next week."

Ed 2: "That really is cutting it close. Ideally the LTA would be done as part of the Needs Assessment - not that you'd do it with all the workers. But during the Needs Assessment your consultant would have gotten a pretty good idea of some real areas of need - for instance, maybe some work processes are really

being changed and some workers will be needed elsewhere in the company. In other cases, perhaps one part of the workforce is aging and certain people will have to go into less physical jobs. LTA is really good for identifying areas of transferability. Doing a few strategically chosen LTAs can really help you establish real training needs based on what is really happening in the workplace."

Ed 1: "You've convinced me. But I wonder why my supervisor hasn't thought of all these things. I'd better arrange a delay so we can back up a bit and take a closer look at the real dynamics of Ambidextrous Dynamics!"

Ed2: "Don't blame your supervisor. We're entering a new age in workplace programs - one in which education, psychology, philosophy and management all converge. We're just used to thinking of these elements separately rather than in an integrated manner. Oh - and one last thing - what about evaluation?"

Ed 1: "Hey - we're not that far behind the times - we're into portfolio assessment as a way of measuring progress."

Ed 2: "Great! Once again, you can make sure that some of the elements of TQ are built into the portfolio design. Best of luck on all this. Ciaou."

Integrating TQ into Literacy Task Analysis (LTA)

The What

Literacy Task Analysis is a method for identifying the bedrock skills found within jobs. This includes not only reading and writing and maths, but also such areas as problem solving and critical thinking. Literacy Task Analysis has many diverse methods, ranging from interviews with job incumbents to developing job matrixes which break down literacy components of job functions.

In effect, Literacy Task Analysis provides an in-depth job description - one which has been layered to display prominently the literacy requirements needed to do a job.

The Who

An adult educator, vocational counsellor or other professional in the employment field can conduct a Literacy Task Analysis after a short training session. Manuals are also available to those wishing a more detailed look at the process.

The Why

A Literacy Task Analysis is often used to compare two or more jobs. Looking at jobs in "clusters" is a useful way to identify mobility paths for workers - realistic ones built on real knowledge of the incremental skills required to move from one job to another. Literacy Task Analysis can also be used to identify basic skills required for entry level workers.

The Where

Literacy Task Analysis must be done at the worksite since it involves both observation and interview. If the worksite is messy, noisy or dangerous, the interview can take place in a lunchroom, an office, or in the case of construction, a site trailer.

The How

There are many methods described in the *Literacy Task Analysis Manual* (Taylor, Lewe, 1990) and *Basic Skills Training, A Launchpad for Success in the Workplace* (Taylor, Lewe, 1990). Both of these resources are available from me in photocopy form. A larger bibliography is included at the conclusion of these manuals.

The method which I have found most useful is The Structured Job Analysis Interview, developed in Britain by Pearn and Kandola, 1988. This is set of 33 questions, organized under the headings:

- Place in the Organization
- Main Objective
- Duties and Responsibilities
- Contact with Others, and
- Physical Environment.

I would recommend using the Structured Job Analysis Interview, with an additional set of questions to address TQ concerns. The added questions would focus on the 11 aspects of Total Quality described on the next page under the heading *"What Makes Total Quality Tick?"*.

Relevance of Literacy Task Analysis to Total Quality

There are several ways in which a LTA may come to the aid of a basic skills trainer in a high performance workplace.

- A basic skills trainer entering a TQ workplace for the first time will want to establish the extent to which the Statistical tools, the team building, and the worker responsibility focus are actually operative. The observation and interview phases of an LTA will provide the trainer the opportunity to actually see what is there and what is not.

- Building on this knowledge of what is there and what is not, the trainer will have a good idea of whether to make the basic skills program highly integrative (if TQ is in full bloom) or mildly integrative (if TQ is more observed in the talk than in the walk.) This is important since if the skills provider attempts a fully integrative model in a workplace which is not really utilizing TQ concepts in a big way, this will create confusion for trainees. On the other hand, to ignore TQ in a workplace where it is in full flower will make the trainer seem less than relevant.

What Makes Total Quality Tick?

Any look at the links between bedrock skills and total quality must be based on a thorough understanding of Total Quality. What makes it tick?

- Focus on the customer
- A "Systems" approach
- A long-term relationship with suppliers
- Enlarged communication and dialogue between workers in different divisions and levels. Employee involvement in decision making.
- Understanding of variation, with processes in statistical control (not confusing "common cause" with "special cause")
- Replacement of numerical goals with a method to improve the process *(By What Method?)*
- Abolition of merit pay and performance evaluation
- Adoption of the PDSA Cycle (Plan, Do, Study, Act)
- Eliminate where possible "Non- value-added" parts of processes
- Emphasis on training and education
- Replacement of competition by cooperation.

Here is a closer look at each of them. I have included comments on their relevance to learning professionals such as bedrock skills trainers and facilitators. Since bedrock skills trainers are often outside adult educators working on a contractual basis, and facilitators are most often employees of the organization, perspectives may vary. I have also considered how each aspect may be of interest to senior managers up to and including the CEO.

1. Focus on the Customer

"Focus on the customer", or "delighting" the customer, may seem old-hat, and one could say, "Of course that's important, and ho-hum about that." It takes only a little bit of thinking, however, to see how much this tried and true old saw is seen more in the breach than in the observance. Two vivid examples come to my mind, and I am sure that you can think of many others from your own experience.

Delighting the Customer - Not!

A friend and I recently went to the cinema on a particularly cold and frosty Ottawa evening in February. We arrived 10 minutes before the theatre box-office was to open and joined a short queue on the sidewalk. The heavy glass doors were locked and we, a shivering group of about 10 prospective patrons, were waiting on the windswept pavement. Attempts to catch the eye of the two female ticket sellers within failed. We surely would have appreciated a hand signal from them to indicate our waiting time.

As we waited disconsolately, two young male staff members arrived and entered using a key. A minute or so after their entrance, an enterprising member of our waiting group realized that the door had been left ajar. Availing himself of this opportunity, he entered the vestibule, our small group close at his heels. This unexpected entry to the "holy precinct" elicited responses more appropriate to athletes at the Munich Olympics than to customer service representatives. One of the young women asked us to leave until the appointed time, some 5 minutes hence, while the other ran upstairs to obtain reinforcements. She returned hastily with the very young man in tow who had precipitated the incident by leaving the door ajar. He told us we would have to wait outside, because he did not have the "authority" to allow us to remain inside.

Our appeal to the outside temperature did not impress him in the least, his comment being. "Well, gosh - this is winter." Nor was our comment that the roomy vestibule was ample space for orderly queuing a valid argument. As a matter of fact, the young man became quite panicky as he perceived several other patrons on the outside sidewalk trying to wrest open the now partially closed door. "Don't let them in." he pleaded. We now had an "in group" and an "out" group and a clock ticking to the time when the two ticket sellers were "allowed " to begin selling tickets.

There was yet more to come. The young man vaulted upstairs again "to get authority" for our continued occupation of the vestibule. Returning with a set face he said "No - you really do have to wait outside because..." At this instant, time turned in our favour and one of the young ladies said, "It's ok, David - it's time now." The incident disintegrated into nothingness, tickets were purchased and the movie commenced. I found, however, that I was focusing just as much on the lobby scene as I was on the lovely British countryside in the movie. Clearly, customer satisfaction did not rate high with this establishment, nor was the concept of "empowerment" of employees being applied. I don't know if this particular cinema company purports to use TQ. If it does, it surely is not applying it.

"You kiddin', lady?"

The second example which comes to mind occurred in a shoe repair store. A woman, dissatisfied with a repair job, asked for her money back. With no attempt at dialogue, the shoe maker

snarled. "You kiddin', lady? You want insole - you get insole." The next day a large homemade sign in red lettering stood on the counter - "No returns." Customer satisfaction clearly was not part of this businessman's philosophy either.

Neither of these two incidents could have occurred in a business which believed in Total Quality, because customer satisfaction comes high on the list of necessary requirements. Indeed, "satisfying" the customer yields to "delighting" the customer, the theory being that one can always do better than what is merely satisfactory. In the examples given above, the cinema staff closest to the customers would have been able to make decisions about how to deal with line-ups on uncommonly cold evenings, and the shoemaker would have made an effort to see how the repair had been inadequate and how it might yet be adjusted.

Clarifying the Role of Customer

The Total Quality definition of "customer" takes on a unique focus. The customer may be "external", as for instance, the purchaser of a product or the recipient of a service, or "internal", the person after you in the production line or the receiver of your work, be it a report or a data entry sheet. It is important to be aware of both types of customers and endeavour to please them. Customers may be persons in a higher, lower, or equal position to oneself, and include persons both inside and outside the company, including both suppliers and users of products and services.

Using this extended definition of "customer" serves to clarify our role in regard to other people within the system and the ways in which we are able to assist others, whether they are the final recipient of a product as in the traditional definition of customer, or a co-worker who must use the fruit of our labours in some way.

Customer Focus

Relevance for Learning Professionals

It will be helpful for the educator or trainer, when preparing curriculum materials in the areas of reading, writing or numeracy upgrading, to be aware of this definition of customer. Applying this definition when talking with workers will allow the educator to make sure that materials respond to employees' needs in pleasing their own customers.

At an early session of the group, the educator may wish to ask participants to identify their customers and their main interactions with them. If the educator discovers, for instance, that Joe's down-line, internal customer must read his reports and interpret his graphs, then helping Joe with clarity in report writing and appropriate use of diverse graph types may be useful. If Sally must make brief oral presentations to her "customer" it may be helpful to look at presentation skills and conciseness in expression. Knowing who the trainees' main "customers" are and the main modes of interaction will assist the educator or trainer in making content decisions.

Many workplaces have not invited in basic skills trainers from the education community. Often workers will learn about the various concepts of "customer" from a Total Quality trainer or from a facilitator who has completed Total Quality training. Unfortunately, often these skilled professionals do not know how to help people who need to improve their reading and writing. They may not realize that some aspects of dealing with customers may present significant problems to workers with skills upgrading needs. The facilitator may wish to attend a workshop on bedrock skills or consider linking up with an outside trainer.

Customer Focus

Relevance for Senior Managers

Senior managers are ultimately responsible for employees understanding who their internal and external customers are and how the definition may change with the addition of new product lines or shifts in marketing tactics. More importantly, senior managers are responsible for establishing an organizational framework and support systems which will provide a comfort zone for workers as they look at their interface with their customers. If, for instance, self-directed or cross-functional work teams have been newly set up as the organizational framework of choice, it will be important even at the CEO level to give some thought to how to help employees adjust to the unfamiliar. It will be important to consider ways to provide support to the new way of doing things. This may mean providing some resources for bedrock training with a team focus, or it may be as simple as making sure that learning professionals used by the organization are pooling their efforts to integrate bedrock and team learning.

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2. A Systems Approach

Systems thinking is the ability to see the whole rather than seeing only parts. It is at the heart of Total Quality Management. In effect, Total Quality eliminates the view that each division or directorate in a company or organization is a self sufficient entity. If Marketing, Design and Production divisions of a company are working in a vacuum with few contacts among themselves, they will not have the whole picture and will thus miss out on maximizing customer satisfaction.

Design people need to know what Sales people are learning from customers about product suitability and use; they also need to know what aspects of production are problematic to those actually manufacturing products. In a sense, a flow chart, starting at consumer research and design and including every function of the company right through to distribution and customer feedback can be used as an organization chart, thus eliminating the hierarchical pyramid of the old organizational paradigm. Peter Scholtes, in his *Team Handbook* (Joiner, 1993) depicts a "Living Flowchart", clearly outlining the interdependence of processes and all those persons working on various parts of processes. The interdependence so graphically shown in his living flowchart indicates the strength of the need for systems thinking.

Understanding the System

Clearly, a systems approach strengthens the customer focus. However, organizations espousing the old paradigm of hierarchical leadership have a great deal of difficulty accepting such a fundamental change. Those of us who have worked in a company or a government department with the hierarchical approach to management will remember the frustrations. It was common to say: "Those other divisions don't know what we do here. They don't understand us." The obverse of the coin was that neither did we understand them - nor did we or they want to share information. Protect your turf was the warcry. Jockey for position. Try to get as many "files" as possible.

One can well imagine what would happen if the human body, surely a system if ever one existed, were to operate in the ways in which many companies operate. What would happen if the stomach were to say, "I am in charge of food here, and I am in control. Go away, Mr. Small Intestine and Mr. Large Intestine. I won't be needing you today. Come to next week's meeting if you must and I'll see if I have any need for your services."

We are all parts of many systems from ecosystems to political systems. The graphics on the habitual cover of *The Journal of Nutrition Education* shows a series of boxes - each box contains one item - namely a bag of groceries, a book, a globe, a barn and silo, an adult and child walking briskly, a television set, and a dinner plate with cutlery. What is being represented is a system which is the backbone of good nutrition. It may be described as food, recipes, land and water, farm production, exercise, information and knowledge, meal preparation and presentation. If persons responsible for each of these areas for good nutrition work only in their own area with no communication among the others, it is unlikely that balanced information about nutrition will reach the public. Fortunately, nutritionists, dietitians, doctors and other health care personnel collaborate to make sure that information is shared and the necessary connections made to shape future research and policy. *The Journal of Nutrition Education* helps to ensure that the unconnected parts do connect in order to bring about a wider picture based on systems thinking.

Peter Senge, one of the major experts of a systems approach has outlined the value of systems thinking. His book, *The Fifth Discipline, The Art and Practice of the Learning Organization,* is as interesting for what it doesn't say as for what it does say. While obviously fitting squarely into the Continuous Improvement paradigm, he does not credit Deming and Juran with influencing his research, nor are their names mentioned in the Index.

Nevertheless, the "fifth discipline" mentioned in Senge's title, systems thinking, coincides very neatly with the Deming and Juran definition. The other four disciplines Senge presents are Personal Mastery, (continually clarifying and deepening our personal vision); Mental Models (assumptions or images that influence how we understand the world and how we take action); Building Shared Vision (the practice of unearthing shared "pictures of the future" that foster genuine commitment and enrollment rather than compliance); and Team Learning (suspending assumptions and entering into genuine "thinking together.")

Systems Thinking: the Conceptual Cornerstone

Together these five disciplines form the components of a Learning Organization. Senge describes systems thinking as the fifth discipline because it is the conceptual cornerstone that underlies all the learning disciplines. All are concerned with a shift of mind from seeing parts to seeing wholes. Peter Senge provides insight on systems thinking through many examples drawn from corporations with which he has worked. He is the author of choice of many persons interested in exploring the profundities of systems thinking.

Systems Thinking

Relevance for Learning Professionals:

In the old days, Production workers probably didn't have much to do with Marketing representatives or Design specialists. In the TQ workplace, however, they are likely to serve on work teams together, to share work space, and to accept direction either formally or informally from a wide range of supervisors. In addition, systems thinking requires all workers to explore actively ways in which they can contribute to continuous improvement in the way jobs get done. This requires new skills for many workers who were in the past accustomed simply to respond to direction rather than question whether methods can be improved. Supervisors and workers learning together builds a learning culture and de-stigmatizes a potentially highly charged relationship. There is, however, a certain amount of confusion as the concept of supervision itself becomes outdated and is replaced by a more collaborative concept such as team leadership. The team leader replaces the supervisor.

In a "systems" workplace, the trainer will be drawing trainees from a broader area. Since hierarchy will be less important, supervisors and production workers may be receiving training at the same time. Rather than having separate focuses and interests, these will tend to coalesce. It will be important for the service provider to get an idea of the kinds of issues debated between the various components of the system so that vocabulary and content in curriculum design will be relevant. In other words, *curriculum design will need to be systems focused to reflect the environment in which the training is taking place.*

The facilitator is especially well placed to see the systemic aspects of the organization. Cross-functional teams will bring together people from various parts of the organization. A facilitator who is sensitive to the importance of bedrock skills will notice if certain individuals never volunteer for teams or if they are sick when it is time for the team to meet. Both conditions could be symptomatic of fear of being put in an environment where basic skills deficiencies will show. Working in a systems-wide context places stress on an employee who may have had a small and comfortable niche in the past. Systems thinking often leads to the development of new methods of liaison across the organization - methods which could include reading and writing. Flow charting, so often associated with figuring out systems interrelationships, presents its own difficulties for workers with no experience with graphic presentation. The facilitator will want to devise an approach to training which may involve mentoring by other employees.

Systems Thinking

Relevance for Senior Managers

Most senior managers who promote systems thinking in the organization are probably aware that it is a difficult concept for many workers, especially those who have spent many years in a very different paradigm. Some managers promote systems thinking on the one hand, while unwittingly setting up countervailing forces. Working across the organization will not be effective if recruiting and promotion policies still harbour the notion of separate divisions.

3. **A Long Term Relationship with Suppliers**

Extending the Systems Approach

Each aspect of Total Quality seems to build on the others. Building a strong relationship with suppliers is really an extension of the systems approach. In the world of Total Quality there is an advantage for a company to rely on a single supplier for an item rather than shopping around all the time for a cheaper price. When a customer and supplier are continually working together toward mutual gain there is a buildup of trust. The supplier, with some sense of security, will give extra attention to the needs of the company and will eventually improve quality and lower costs. The supplier becomes, in effect, a partner of the company rather than a distant entity who is simply being used for the convenience of the moment and who may be supplanted tomorrow.

With a single supplier for an item, both the supplier and the purchasing firm can work toward minimizing variation in measurement or in other specifications which can affect quality. It is this working together toward minimal variation which cements the partnership and which validates why and how the supplier is part of the system.

As with the word "customer", the word "supplier" can have several meanings depending on the context. The meaning is most obvious in the case of a manufacturing company where a company may provide, for example, metal castings which may be used to produce power tools. The meaning is less obvious with an institution such as a college. The definition of "supplier" used by Humber College's Business and Industry Services is an example of this extended definition. This division of the college provides training services, and the suppliers are the trainers and consultants who design and conduct this training. Humber has identified six specific steps in managing their supplier process - recruitment, selection, orientation, contractual agreements, evaluation/feedback, and retention. Just as a manufacturing company's products can go awry if suppliers provide off-gauge castings or defective materials, so can an institution's services go awry if there has been a poor selection of trainers or their orientation has been slipshod.

Humber College built its relationship with suppliers by first of all gathering information from stakeholders and examining successful training standards elsewhere through a process known as "bench marking". They used a Continuous Improvement Problem Solving Model to better understand the dimensions of the college/supplier interface. This has helped them to avoid problems which would emerge with a more laissez-faire approach.

A Long-term Relationship with Suppliers **Relevance for Learning Professionals** The learning professional may be surprised to note that suppliers are not viewed as outsiders. It may be that employees of suppliers are even invited to join in a number of corporate planning and product evaluation meetings. They may even be eligible to participate in upgrading sessions and other training activities. That will depend on how devoted the company is to accepting this particular tenet of Total Quality. If the company is indeed open to the concept of supplier partnership, the potential pool of trainees will be much enlarged! Program content will thus reflect the vocabulary and context of suppliers as well as the company using the supplies. The facilitator may wish to hold an information session so that employees at all levels can get to meet the suppliers and learn of supplier goals in regard to the organization. Even if there is no such thing as a workplace skills upgrading program, the facilitator can do several things to make sure that employees with low-level bedrock skills understand the importance of the company/supplier interface. A glossary of terms describing equipment gleaned through the supplier may be useful, as well as oral and written explanations of Quality Improvement tools used to measure supplier compliance with specifications. If some workers have difficulty understanding the explanation, the facilitator may wish to consider inviting in an outside service provider to teach basic reading and math.	**A Long-term relationship with Suppliers** **Relevance for Senior Managers** It is senior management who in the final analysis determines how the company/supplier interface will work - whether there will be an emphasis on shopping around constantly for the lowest cost supplier or an effort to build trust by building long term and trusting relationships with certain key suppliers. It may be useful for senior managers to analyse their track record in this regard. If there is no clear policy in this area, then it is unlikely that the kind of collaboration between supplier and learning professional refered to above will be able to flourish.

4. **Enlarged Communication/Dialogue - Employee Involvement in Continuous Problem Solving and Decision Making**

Building a Learning Culture

In a Total Quality workplace, workers at all levels are encouraged to come up with suggestions for improvements. Self directed or cross-functional work teams are established to make workers feel comfortable with making suggestions and extrapolating them into decisions. Study groups are also formed, partly to look at work processes, but also to further employee goals in personal development and education.

While this may look perfectly logical and doable, it is not easy to accomplish unless a learning culture has been developed within an organization. A learning culture does not just happen. It requires leadership right from the top of an organization.

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Employee Involvement in Problem solving
Relevance for Learning Professionals

In an organization which does not have a learning culture and leadership from the top, the slackness of focus and the lack of shared values will be palpable. This will make the trainer's task difficult. Providing training in an organization with no learning culture will demand all your skills of motivating and encouraging. You will not be able to achieve as much as you would like as fast as you would like - but you have to start somewhere. Good luck! If, on the other hand, you have the good fortune to gain access to an organization in which employees are encouraged to communicate with one another in an atmosphere which is friendly to problem solving, you will be able to spread your own wings. You will be able to facilitate worker communication skills, secure in the knowledge that they will be able to put them to use and will not be penalized for showing initiative in seeking and carrying out improvements.

Obtaining appropriate employee involvement in decision making is what the role of facilitator is all about. Yet organizations may lack a sufficient number of facilitators to operate on all fronts simultaneously. While Total Quality problem solving tools are well known to facilitators, they may be difficult for some workers to apply. Workers with little formal education (or ineffective acquisition of formal education) may have difficulty with the abstract thinking which accompanies much problem solving. Once facilitators see employees resisting certain problem solving tools used to generate decisions, they should be able to substitute a more concrete tool.

Employee Involvement in Problem solving
Relevance for Senior Managers

No one says that empowering employees to take decisions is easy. My niece recently witnessed a failed TQ initiative in a factory where she was employed as a summer supervisor. A transformer company tried to empower workers by asking an assembly line of six women to make their unit more efficient. There was no attempt, however, to make sure that these workers understood their role in relation to the total system. Nor did team facilitation take place to make sure they had the skills to do what they had been asked to do. They were simply thrown into an assignment to "make things better". Perhaps it is no surprise that with no process and no guidance this effort foundered in a random trial and error. The employees were unhappy, feeling they were wasting their time. My niece quit in disgust.

I saw a different form of empowerment while doing a job analysis at a construction firm. The carpenter foreman at this particular worksite showed natural skills as a coach and mentor. Even though apprentices and carpenters were not expected to be totally familiar with blueprints, this foreman carried the blueprints around on the job site, pointing out aspects as they became relevant during the actual doing of the job. When a new task was to be performed, he did not tell the apprentice how to do it, but asked him how he would go about the task. Only if the method described had clear disadvantages or problems would he overrule that approach and suggest another. In this way, he built the problem solving, analytical strengths of the apprentice, empowering him in independent decision making. Without being able to contribute to solutions/decisions, employees will not feel that they belong.

5. **Understanding of Variation - Processes in Statistical Control**

Variation is natural. There will always be variation. When a process is stable, output is predictable. What is important is not whether a worker produced more or less than yesterday, but whether production comes within the normal variation of what the system can provide. By looking at production in terms of the natural variation within the system, blame of individual workers can be avoided. Problems are not "worker" problems but "systems" problems. The remedy is to be found in improving the system - not in punishing or replacing workers.

Having processes in statistical control is a natural outgrowth from the understanding of variation. In the TQ philosophy, as already indicated in Point 2, most trouble with service and production lies with the system rather than with individuals. Often, however, mistakes are attributed to persons rather than to the system. This happens because management has not gained an understanding of the system and has not learned to distinguish "common" from "special" causes. "Common cause" refers to natural variation caused by the operation of the system, while "special

cause" refers to variation caused by some special, rare event such as a machine breakdown or a short circuit in electrical equipment. A statistical control approach to variation avoids blaming people when things go wrong. Dr. Walter Shewhart, the Bell Labs physicist who conducted the original research in this area, used the word "assignable" cause rather than "special" cause. Whichever term is used, the concept is the same.

Control charts which plot activity such as machine production or units produced with upper and lower control limits helps managers and workers to distinguish variation from "common" and "special" causes, thus determining whether processes are in statistical control. This helps to detect problems within the system which may harm production - such as faulty valves, inadequate seals, or obsolescent or inappropriate equipment.

Understanding Variation
Relevance for Learning Professionals

Workers may need some assistance in understanding the dynamics of variation. This could be a focal point for discussion in a skills enhancement program. Workers need to know, for instance, that data must be used with care.

Change the process for measurement and you produce a new number. Much data collection has fallen prey to inconsistency and "apples and oranges" fallacies. Knowing the in deciding what to include in the count. In counting the number of defects, do you count only those which are discarded or also those which went back for rework? It is important to be consistent over a period of time. The instructor may want to build a full exploration of variation into the content of a skills upgrading program. In order to do this, he or she will need to become familiar with the scope of variation in the particular workplace, as well as the breadth and depth of variation in its more general application.

If workers and their managers are to be able to properly use control charts which track variation over a period of time they need to distinguish variation from "common cause" from variation from "special cause".

The preparation and use of control charts calls upon basic statistical skills. It also calls for a linkage between information conveyed by words and information conveyed by numbers. The interaction between language and numbers is an area which bedrock skills trainers could examine in depth. In cases where workers come from a variety of linguistic backgrounds, they may not all share the same degree of understanding of the vocabulary of control charts and other statistical tools used to track stability of processes. Depending on their country of origin, they may also have learned different systems of measurement - either imperial or metric, and thus require exercises in conversion.

Many large or medium sized companies may employ an expert in Statistical Process Control to train employees in the techniques of SPC. It may be useful for a bedrock skills instructor to team up with that expert so as to provide assistance to workers at the lower end of the SPC skills continuum. This could be presented as an Introduction to SPC. Such a collaboration would relieve the SPC trainer from the necessity of dealing with basics when he or she prefers to deal with higher level concepts. An educator who has been teaching classroom math will need to brush up on the terminology and scope of SPC, and above all, its applicability in real life situations before attempting this.

Few workers actually prepare the SPC charts and graphs, but all employees are expected to understand them. Often charts and graphs are posted on the wall so that they may be studied in advance of a team meeting. The facilitator should not assume that employees have analysed data just because it was posted. It will be appropriate to explain (or get a SPC expert to explain) the techniques in some detail. It would be useful to prepare a very simple prototype sample chart which will assist employees to understand statistical concepts. The facilitator should not assume that just because team members do not ask questions that they probably understand content and implications. In fact, the reverse may be true.

Understanding Variation
Relevance for Senior Managers

According to the Total Quality philosophy, managers who are constantly looking for increased production may be doing the organization a great deal of harm if they are focusing on variation without examining whether it is the "common" or "special" cause variety.

Managers may also fall prey to the delusion that just because training in SPC has taken place that everyone is at the same knowledge level. It may be useful for managers to ask learning professionals or skilled SPC implementers to identify just what barriers there are to clear understanding of SPC. Once the barriers are identified, they may be remedied through targeted and focused training.

6. **Replacement of Numerical Goals by Methods to Improve the Process**

The 94 to 6 Ratio

According to key Total Quality proponents, 94 per cent of problems belong to the system and are the responsibility of management. Only six per cent are attributable to special causes beyond the control of the system and will need to be dealt with on an individual basis. Despite this, it has been commonplace for managers in the past to constantly strive for higher numerical goals. "If you made 100 widgets today, your goal should be 110 by next week and 120 by next month." The fallacy of this type of numerical goal setting is that it does not establish a *method* by which this improvement will take place. Therefore, it is almost certainly bound to fail. Using a "methods" approach, however, you can say that the goal can be reached by improvement of the present process. *By What Method?* By repairing the machines? By cutting out unnecessary steps? By training workers? *Not* by working harder!

Emphasizing a methods approach to process improvement does not mean that concern for quality is discarded. Businesses perceive both Quality and Quantity as important. It can be argued that producing quality products or services is illusory if not enough of them are produced to meet market demands. Discarding reliance on numerical goals does not mean forgetting about daily or monthly quotas. What it does mean is that process improvement takes the front seat. Most businesses have found that when processes are improved, both quality AND quantity go up.

> It is interesting to note that a focus on continuous improvement in *quality* has beneficial effects on *quantity*. The reverse is not true.

A focus on production goals without looking at them within the framework of Continuous Quality Improvement (CQI) does not have positive effects, except possibly in the immediate short term.

Replacement of Numerical Goals
Relevance for Learning Professionals

The thinking processes of workers operating in a TQ environment will soon take on a "methods" focus. The bedrock skills trainer will want to buy into that focus as well. Often the method of improvement which will make a difference emerges from a focus group discussion in which several stakeholders have shared perceptions and explored possible solutions. The educator may want to conduct some of the basic skills instruction in the format of a focus group in which problem solving takes place using the vocabulary and issues of the workplace. This may mean that the educator will display facilitation skills more than instruction skills and will ease participants toward methods- based solutions while building their problem solving and teamwork capacities.

The interrelationship between language and numeracy will be particularly evident as the question "*By What Method?*" is asked. Whether it is the preparation of flow charts, scatter diagrams or control charts, analytical thinking will be teamed with the application of the appropriate statistical tool. Trainees often exhibit uneven skills in the language and numeracy areas, thus providing educators with the opportunity to build skills in the area of least strength for each trainee.

Much of a Total Quality facilitator's training centres on how to bring about process improvement. This may be done through a number of steps.

1. Depict a process.
2. Collect and measure data on the process.
3. Identify key factors.
4. Design a better process where possible.

A facilitator may be surprised on occasion when a worker who knows a process backward and forwards is unable to depict it on paper. This may be the time to call upon another learning professional - the skills upgrading educator, for assistance. If that is not possible, a buddy system may help where a trusted co-worker assists. The facilitator should make sure that assistance is not of the type "Hey, I'll do that for you.", but, rather, is of the type "I'll be glad to show you how to do it."

Replacement of Numerical Goals
Relevance for Senior Managers

In the rush to be more competitive it is easy to focus on quantity and the need to fill the shelves. Senior managers who focus on methods rather than simply on getting the numbers right will be ahead of the game.

7. **Abolition of Merit Pay and Performance Evaluation**

From grades at school to ranking at work, we have all become accustomed to being ranked - first, second, last. Ranking in the workplace is often based on "MBO" or "MBR" - Management by Objectives and Management by Results. Objectives are set at the beginning of the year for a reporting period and the employee is ranked against these objectives. The fact that reality changes and that other objectives may become more important during the year is seldom considered.

> According to the TQ philosophy, ranking is bad - demoralizing for the individual. TQ also views merit pay as misguided, because it breeds competition rather than cooperation. The workplace becomes a battleground with employees vying against their peers for greater approval from management. The needs of the customer are soon forgotten.

Commission sales also present a problem. The company's top salesman may be doing more damage than anybody to the company, since to gain his commission he may try to sell top price items to people rather than satisfying their real needs. This kills repeat sales. Dr. Deming often pointed out this effect during his seminars.

Abolition of Merit Pay /Performance Evaluation Relevance for Learning Professionals

This aspect of Total Quality will affect the ways in which educators in the workplace evaluate trainee success, as well as how the success of a training program may itself be evaluated. Many educators may reduce reliance on marks and ranking based on traditional tests and replace it by methods more sensitive to the goals of TQ.

The trainer may wish to use more "systems" questions to evaluate training.

- "What could have been done to make this training better for you?"

"Has this training helped you at work and in your personal life?"

" In what ways?"

Various learning goals which have been achieved and which may require further development can be identified at this stage and monitored over the next several months so that the trainer is benefiting from real feedback from the trainee.

Trainers conducting basic SPC training may face some resistance in this area and may be expected to provide more traditional assessment. This will be particularly true if a company is not utilizing SPC as part of a Total Quality transformation, but rather as a specific technical initiative, disembodied from the larger management philosophy. There are many instances in which this will be the case. Adult educators will need to be aware of the extent to which the company has embraced TQ, since it may be impossible for the trainer to provide TQ sensitive evaluations in an environment which has not yet chosen it.

Many facilitators will not have to deal with this issue, since a great many companies which have otherwise adopted Total Quality have resisted this aspect. In addition, the facilitator may not be responsible for evaluating employees. If the facilitator is asked for input into evaluations, as occurs in many 360 degree evaluation systems, this is a good opportunity to provide feedback on how the employee's work contributes to the company on a systems wide basis. The facilitator will also be well placed to recommend training and development needs.

Abolition of Merit Pay/Performance Evaluation Relevance for Senior Managers

Intrinsic rather than extrinsic rewards are the answer in this probably least understood and most misapplied part of the Total Quality philosophy. Recognition and appreciation will mean more than monetary rewards. Replace the Annual Performance Evaluation with an informal meeting between employee and manager in which "systems" questions will be highlighted.

- "What could be done to make your job better?"
- "What are you hearing from your customers?"
- "Let's monitor these aspects."

8. **Adoption of the PDSA Cycle**

The Plan, Do, Study, Act (PDSA Cycle) is a flow diagram for learning and for improvement of a product or process. The cycle was developed by Walter Shewhart of the Bell Labs and was used by W. Edwards Deming in his work in Japan in the 1950s and thereafter.

The four parts of the Cycle are:

1. Plan a change or test, aimed at improvement,
2. Do - Carry out the change or the test (preferably on a small scale).
3. Study the results. What did we learn? What went wrong?
4. Act. Adopt the change, or abandon it, or run through the cycle again.

According to Brian Joiner, a key Quality strategist, study is probably the most important part of the cycle. It is hard to get people to study what they have done and figure out how to do it better in the future.

The study phase, says Joiner, (Quality Enhancement Seminar, Costa Mesa, California, 1993) is made up of three elements.

1. Environmental Analysis - Looking at economic factors, competition, world markets and technology.
2. Internal Analysis - Process capabilities, including a SWOT analysis - Strengths, Weaknesses, Opportunities, Threats. What is our ability to produce new products and train workers?
3. Customer Analysis - Their needs, their wants, where the company is headed in serving and expanding the market.

In a company devoted to Total Quality, the PDSA Cycle becomes the blueprint for implementation.

Adoption of the PDSA Cycle
Relevance for Learning Professionals

A Flow Diagram for Learning

Since the PDSA Cycle is a flow diagram for learning both by the organization and the worker, it is a good starting point for an adult educator delivering training in the workplace. While workers at low basic skills levels may not be involved in the cycle in a major way, they will probably be aware of its use and involved to some extent. The PDSA Cycle (also known as the PDCA Cycle - Plan, Do, Check, Act) calls for the development of "scientific reasoning" through a phenomenological approach, whereby the learner tries to understand phenomena (conditions and events) by raising hypotheses about what caused them.

Some Uses of PDSA

There are many ways in which the adult educator can use the PDSA Cycle to guide basic skills program content. Here are just two examples:

- The Environmental Analysis part of the "Study" phase provides the context for the adult educator to lead or facilitate discussions of the company's product and how it relates to the competition. In order to build both speaking and writing skills, students could be asked to discuss the product in small groups, summarizing their views on flip charts. "What do you like about your product? How does it compare with the competitor's product?" This would be a good starting point for "compare and contrast" exercises and for exercises building on analytical capacity. How to prepare lists of "pros" and "cons", how to debate with one's peers, and how to organize talking and writing points could all be emphasized.

  If the company makes a consumer product like a razor or a portable vacuum cleaner the educator might get groups to use both products for a week and use the results as the focal point for discussion the next week. Collecting data and running tests on the products would be a useful skill building activity. Using such a relevant content area for basic skills development will spill over into Work Teams and other Quality initiatives in which the employees are involved. In this way, the basic skills program becomes an integrated part of other training and development activities.

- If a company uses the PDSA Cycle or a variant of it throughout the company, the adult educator will want to explore with trainees how they are using it. What bedrock skills are being used as they carry out the various parts of the cycle? Do they need to upgrade a few skills before they plan a test? Are they comfortable with the reading, writing and math dimensions of the change or test that they are carrying out? Have they learned how to write up their results and an action plan for the "act" phase?

  These will all be fruitful areas for the bedrock skills provider in a Quality workplace. It will be important, however, for the provider to liaise carefully with supervisors and managers and to develop a good working relationship with them in addressing what might be perceived as sensitive content areas. It is essential that the educator provide guidance in the bedrock skills aspect of these areas without trying to take over or direct conclusions. The instructor truly becomes a "facilitator" at this point - that is to say, he or she is concentrating on establishing a process rather than on content.

If the organization has not seen fit to bring in an adult educator to assist in bedrock skills upgrading, the company-based facilitator may wish to fill the breech. The facilitator will be able to perform many of the functions outlined above - with one very important addition. If the organization is headed toward ISO certification, the facilitator may be able to give guidance to workers in how to document the process elements of their jobs.

Adoption of the PDSA Cycle
Relevance for Senior Managers

Senior managers and the CEO can look at how the PDSA Cycle can be applied in both a macro and a micro setting since it can be used for high level strategizing as well as for problem solving on the shop floor. Here are some questions which senior managers may want to ask themselves.

- Is PDSA being formally or informally applied within the organization?
- Has any training taken place in this area so that its dimensions are clearly understood?
- Are its applications and results being tracked or is information lost at the middle manager level?
- Is there a mechanism through which those who have used the technique can compare experiences and draw knowledge and insight from one another?

9. **Elimination of Non-Value-Added Parts of Processes**

Ridding Ourselves of Checks and Balances

I cannot resist beginning this section with a quote from Oscar Wilde. *"She knew the cost of everything and the value of nothing."* That statement, when I first read it, made me do some serious thinking about the difference between cost and value. Organizations have done likewise.

Value-added processes are processes that add direct value to the outputs of systems, and are essential to producing the required outputs at the current level of technology. Non-value-added processes, on the other hand, do not add value to the system's output - only cost. They exist due to defects, errors, omissions and non-conformances, which overall are considered "waste", or due to unnecessary steps in a production process or excessive signatures or forms which can simply be eliminated.

A Systems Analysis Flow Diagram can identify and separate the value-added and non-value-added parts of a process. Many processes are done the way they are because "it has always been done that way". In a Total Quality workplace, processes are examined to see if there are unnecessary steps, such as excessive inspections, or too many signatures required on forms and draft correspondence. These are examples of non-value added steps in a process. So are lengthy waits for approvals, and many processes put in place to deal with correction of errors or rework.

Non-value-added processes exist, it is said, because our businesses do not trust, educate, and train people adequately. That is why there are multiple layers of checks and balances. They exist, also, because the traditional production line, which has been with businesses for many decades, places inspection at the end of the line rather than during the process. This type of inspection has often been referred to a "quality assurance" even though it is too late to influence quality at this inspection point other than to scrap product or to make a category known as "seconds".

When non-value-added processes are removed, responsibility is placed where it belongs - with workers doing the job. Of course, it is important for management to ensure that people doing the job have appropriate training and education.

How do you reduce and remove non-value-added processes? According to Total Quality experts, you simply identify them and stop doing them, except, of course, those required by legislation. These require education of legislators.

Elimination of Non-value-added
Relevance for Learning Professionals

Getting rid of checks and balances is one of the most empowering characteristics of Total Quality. It is also one of the key spurs toward identifying training needs. Many companies who have recently embraced Total Quality have only just finished analysing and eliminating the Non-value-added aspects of processes. Some are experiencing growing pains, however, since, having eliminated inspections and excessive sign-offs, they now find that workers lack some of the skills needed for taking responsibility in areas where their input was previously checked and re-checked. This is where the bedrock skills practitioner may want to work with employees to assist them in gaining sufficient competence with correspondence, forms, and procedures that they will feel truly able to fulfil responsibilities on their own.

The learning professional may wish to confer with management and the union about how the elimination of Non-value-added processes has affected the workplace and what skills are most in need of upgrading now that workers are taking more responsibility.

Elimination of Non-value added
Relevance for Senior Managers and the CEO

For many senior managers it is a huge step to come to the point where non-value-added checks and balances may be removed. There is a certain comfort level in knowing that a letter has been signed off by four different managers rather than one. That must mean that the letter is four times less likely to contain errors or unwise statements. Right? **Wrong!** What it often means is that at least one and maybe several of the sign-off managers will give only cursory attention to the letter since - "Bill will be looking at it anyway." Bill, on the other hand is saying, "The other three managers signed this off so it must be alright." The problem clearly identified in this example, is that by giving everyone a part of the process no one actually had control.

A large part of the reason that so many checks and balances were present in the first place is that managers simply did not have confidence in the employee's ability to write the letter properly. By realizing that the issue here is a training issue rather than a trust issue, managers can move forward more confidently in removing NVA steps from processes. Every time processes are streamlined to remove non-value added steps, senior managers may want to review with Human Resources what additional training may be needed to make sure that the elimination of NVA does not bring other problems in its wake.

10. Emphasis on Training and Education

Training and Education - Taking a Broader Look at the Bottom Line

A Total Quality workplace puts emphasis on both training and education. "Training" may be defined as a job-related learning activity with practical and timely application, while "education" refers to learning which is not job related in a technical sense, but which adds knowledge in diverse subject areas, and builds self esteem. Some skills exist on the hazy border between "education" and "training". Are presentation skills education or training? What about those bedrock skills - literacy and numeracy ?

It is important to realize that not all stakeholders will view education and training in the same way. It would be naive to think that corporate executives are not thinking about the "bottom line" or that union representatives are not thinking at a more personal, worker-centred level. Nevertheless, in a TQ workplace, management is encouraged to take a broader look at the bottom line - one which includes answering the question, "How did our workforce help us get to where we are?" , rather than simply, "How many dollars did we make this quarter?" Taking a longer view than that offered by quarterly dividends helps to change the perspective. Education may not have an immediately recognizable payoff for the company, but it is valued because it is essential to personal development and confidence - qualities which are needed if workers are to be empowered to take responsibility

for the work they do. When empowerment works well for the individual, it does so also for the company.

Total Quality managers are aware that money spent on training, retraining and education does not show on the balance sheet, and that its intangibility has in the past led to its being viewed as a cost rather than as an investment. Nevertheless, the TQ company supports a wide variety of tuition reimbursement programs, study sessions and personal development initiatives.

A Total Quality company views training for managers as equally essential as training for line workers. Management needs to learn about the company, all the way from incoming materials to the customer. Training in systems and methods thinking is considered essential at all levels.

Emphasis on Training and Education **Relevance for Learning Professionals**	**Emphasis on Training and Education** **Relevance for Senior Managers and the CEO**
The adult educator can be a key resource to the company by conducting needs analyses in the areas of education and training, based on interviews with managers, union representatives, and a cross section of workers. A needs analysis will examine both the short term and long term growth needs of the company, as well as the developmental needs of employees. In this context, the educator can broker services of other industry trainers or consultants who may have relevant expertise to offer. This brokerage function is important because the work of private training consultants is often known to educators but not to company management or unions. In addition to the broadly based needs analysis which will yield a macro perspective, the educator can also do job specific Task Analysis, based on interviews with workers and the examination of workplace documents. Both Task Analysis, which examines all job tasks, and Literacy Task Analysis which focuses on bedrock skills within the tasks, may be useful in assisting the educator to develop a curriculum. Such analyses should focus on job clusters (jobs with strong linkages to one another) and on positions at various levels. This is probably a good place to put to rest the myth that only line workers need bedrock skills upgrading. Management needs it too as their skill requirements change and increase. The educator should make it clear that he or she is there to serve the needs of workers at all levels, including management.	Senior management in many companies have recognized that education and training really do have an effect on the bottom line. That is why there is a growing trend toward using Competency Architecture - a process for determining the key skills and knowledge required in a job. Efforts to meld organizational training goals with the personal training goals of workers are gaining ground. It used to be that if a worker's personal training priorities did not match the corporate training vision, there was little likelihood that the worker's preferred training would be approved. There is, however, growing recognition of what may be termed "enabling" skills. These skills are not immediately related to the job but will, nevertheless, assist the worker to do the job more effectively. Workers who have dedicated themselves to community service often find, for instance, that in doing this volunteer work they have added significantly to their communication and problem solving capacity - skills which they then apply at the workplace. In view of this recognition of enabling skills, many companies are moving along the Competency Architecture highway to analyse skills more closely. Lest there should be any confusion on the subject, these enabling skills are - you guessed it - our bedrock skills.

11. Replacement of Competition by Cooperation

What's Wrong with the "Independent Profit Centre"?

Competition has become the favoured way of doing things in North America. Under the TQ philosophy, however, competition is a destructive force leading to dysfunctional behaviour.

A manager of Purchasing, under pressure to reduce costs, orders cheaper supplies. His report looks good. However, he is not cooperating with Production. The cheaper supplies mean more rework, and ultimately higher costs to the customer. In this example, each division is its own

independent profit centre - not part of a system. Internal competition - the need to have a "better" report than a colleague, is harming the system.

Nowhere does this competitiveness v. cooperation aspect show up more than in teamwork exercises. In the old paradigm of teamwork, team members compete within the group, pitting their expertise against others. In the new paradigm, each member of the team is chosen for his unique contribution to group knowledge and each person's expertise contributes to problem resolution.

Replacement of Competition by Cooperation
Relevance for Learning Professionals

The reward system in place in the school system has generally trained people to be competitive. This tendency is not overcome overnight. The traditional classroom arrangement, with its divided seating and individual tests at the end of various course segments, will do little to promote and later evaluate learners' capabilities to work together and solve problems based on team dynamics. In the Total Quality milieu, instruction will need to revolve around problem solving of integrated problems in which many people contribute to the solution, rather than those which are limited to action by one person.

Adult educators can perform a real service by developing and preparing Teamwork Development Seminars for managers and workers which will show the true elements of cooperation. Unfortunately, many educators are still locked in the old paradigm. They will need to re-educate themselves in this area before they can offer genuine assistance to others. *The Team Handbook. How to Use Teams to Improve Quality*, (Scholtes) would be a good beginning in understanding Quality team concepts. Some educators may wish to collaborate with professional team facilitators before undertaking this on their own. For others, the concepts will be natural and easy to implement after gleaning a thorough understanding of TQ principles.

Each of these characteristics has implications for basic skills trainers in a high performance workplace.

At this point, a word of warning is warranted. Total Quality Management is intended to be a total package rather than a pick and choose exercise. Together, the elements add up to what has been called the three "C"s - Customer, Counting, Culture (Sashkin, Kiser, 1993). There is, however, a great deal of diversity in HOW the philosophy has been implemented in various workplaces. Some companies have embraced certain aspects enthusiastically, while leaving others untouched. Others have made every effort to have a full-scale implementation, with varying degrees of success, depending on the level of commitment and the care taken in implementation. This may cause confusion for an adult educator gaining access to a customer for the first time. It will be helpful to remember that TQM, as any emergent management philosophy, will need time to develop. You may detect, therefore, chinks in the armour - and perhaps even mixing of diametrically opposed philosophies within a single workplace. Knowing the core of the philosophy, however, will assist you to sort out anomalies, and thus deal more effectively with the workplace realities which you meet.

Replacement of Competition by Cooperation
Relevance for Senior Managers

"It's neither fish nor fowl." This old saying describes something which displays elements of confusion. That saying may be applied to some workplaces which are moving toward Total Quality but which hold on to many of the old tenets which are conflictual to the TQ philosophy. Does this saying describe YOUR workplace? Senior managers know that it takes more to put a new philosophy in place than to say "Henceforth we shall....."

There are still many examples of organizations moving toward team concepts without giving employees training in team dynamics. Workers may find if difficult to work in a cooperative framework when they have become accustomed to working in a highly charged atmosphere where co-workers are seen as competitors and where individual work is given the highest value. This mind set will not disappear overnight.

Fortunately there are many sources of help for organizations to get attuned to cooperation and team work. A review of Quality Progress, Quality and Participation and other publications put out by Quality professionals will yield a wealth of information in this area.

CHAPTER 2 - UNDERSTANDING THE LABOUR PERSPECTIVE

There are many points of view about TQM within organized labour. In the United States, GM and Ford were pioneers in Total Quality, working with the gurus, thus giving their unions an opportunity to appreciate Total Quality holistically. Others, some of which have come to Total Quality more sporadically, have decided to oppose Total Quality on the basis that it antithetical to the working person. Much effort has taken place in recent years by some elements of organized labour to find a stance on Total Quality which will show workers the danger of the Quality journey.

Union Resistance

There has, however, been a core of resistance to Total Quality from many people in the labour movement. The Ontario Federation of Labour, for instance, has been quite vocal in its opposition. Anyone wanting a clearer idea of the Ontario Federation of Labour's position should look at the paper John Anderson wrote for the O. F. of L. in June, 1993. He wrote the paper in his role as coordinator of the Federation's "Technology Adjustment Research Programme Project". Entitled Total Quality Management: Should Unions Buy into TQM?, the paper defines Total Quality Management, comments on its various elements, and answers the question posed in the title with a resounding "No".

It is important for workplace trainers to understand the scope of this point of view. Accordingly, I am devoting some attention to some of the key points that tend to be made by labour opponents to Total Quality. I have listed 7 one-line points from the above noted study, each followed by my own brief analytical comment.

1. *"Some TQM programs drop any meaningful training plans or any meaningful union consultation."*

> That is probably true. However, companies which do that are not being true to the principles of Total Quality. Rather than attacking TQ, maybe it would be more fruitful to prove to the management that they are doing faulty implementation.

2. *"Even in terms of management criteria, the results obtained by using TQM have not always been evident."*

> Transformation is a slow and tedious task, which needs commitment from the top down and also from the ground up. There are bound to be false starts and time lost spinning wheels. If the lost time becomes a learning experience, is it wasted?. True, many TQ initiatives have failed - maybe even most. But what can be learned from those which have succeeded?

3. *"The problem with TQM starts from its definition of quality; zero defects does not necessarily mean quality products."*

> Many Quality leaders would agree with that. "Zero defects" is associated with the Crosby definition of Quality. Deming and Juran emphasize Continuous

Improvement instead and recognize that zero defects is probably unattainable, and even if it is attainable may be irrelevant if no one wants the product. Unions may want to look at the work of the various Quality gurus and use their influence to ensure that the company espouses the philosophy of the more sensitive among them - or adapts an off shoot that is more sensitive to the labour viewpoint.

4. *"TQM is often used to camouflage downsizing."*

Downsizing is a complex issue and has no one cause. If TQ makes a previously inefficient company efficient this may indeed lead to downsizing. The downsized company may, however, be better able to compete and produce better products owing to Continuous Improvement of processes. This may mean fewer jobs - but stable jobs. What is preferable - a downsized company which is still in business or a "fat" company which goes out of business because of too low a profit margin?

Often production workers are aware of wastage due to poor machinery, inefficient processes, inadequate maintenance or nonconformance of parts to specifications. Workers may be in a "catch 22". If they are empowered to reduce inefficiency, they may then be troubled by the fact that greater efficiency means fewer machines and fewer workers. They can only hope at that point that the company's leadership will realize that increasing market share is only one element of success. Total Quality emphasizes expanding the market - finding a niche that is not being addressed and attempting to fill it. Often this will mean new product lines, resulting in the need for more workers.

5. *"TQM is often used to bypass and gut the existing trade union or to prevent one entering a non-unionized workplace."*

TQ is based on a completely different concept of labour/management relations than has been in effect previously. The "win/win" rather than the "win/lose" approach flies in the face of dynamics which have gained ascendancy over the years. Are unions moving into an era of change in which they need to reexamine the modalities of protecting the interests of their members? Has the union searched for ways to make TQ more attuned to the labour perspective?

6. *"TQM is often used to create an atmosphere of permanent stress justified by the need to compete to survive."*

It is true that workers in a TQ environment are called upon to perform functions which were previously absent, especially working in teams and applying statistical tools. This may cause stress as the learning curve accelerates. But if workers have more autonomy in decision making, is this positive stress or negative stress? It is also true that workers naturally worry about job security and the ability of the company to compete and stay in business. In the new global environment this worry will

always be there and may be even worse in a non-TQ environment which is likely to have greater inefficiency.

7. *"TQM and Continuous Improvement are just slogans."*

While some people may see "Continuous improvement" as a slogan, to others it is the keystone concept on which the base of Total Quality is built. Ford's "Quality is Number 1" would be an empty slogan were it not backed up by dedication to the principles of Total Quality. Dr. Deming, in his now famous Red Beads experiment, satirizes the excessive use of slogans and posters to inspire and motivate workers. *" Exhortations and posters"*, he says, *"generate frustration and resentment. They advertise to the production worker that the management are unaware of the barriers to pride of workmanship."* Barriers include off-gauge materials, instruments out of order, shoddy tools, poorly adjusted machines and the like. TQ is predicated on the notion that workers want to do good jobs but cannot do so when there are systemic problems barring improvements. A poster saying "Do it right the first time" is thus an empty slogan if the systemic barriers to improvement have not been addressed.

There is no doubt that Total Quality has caused a high level of fear in some trade unions. Much of the fear is based on moving into the unknown, on having to interact in ways which are not familiar. Many trade unionists have honed their skills of confrontation - so necessary for negotiating in the "them" vs "us" mode so common to labour relations. It is thus difficult for them to come to terms with the idea of cooperation, of labour and management being part of the same system and partners rather than adversaries.

While some union reticence may be based on the fear of change, some is well founded on direct observance of real problems.

In order for TQM implementation to be successful, several factors must be present.

1. There must be commitment to the philosophy at the top. The commitment must be backed up by in depth knowledge of the philosophy in all its aspects and resources available to make things happen.

2. The union must be included from Day 1. Trying to implement TQM without including the union is like trying to have a baby without both parents having a role. Maybe it's a good time to get rid of the "M" in TQM. Why would unions want to buy into a philosophy of which the very name tends to favour one side of the labour/management duality by mentioning one and ignoring the other?

3. The various elements of Total Quality cannot be introduced piecemeal and they cannot be superimposed over an inimical management philosophy. That is why "transformation" is often mentioned. In the world of nature you swim if you are a fish and you fly if you are a

bird. Some of the poorly planned "hybrid" TQ programs have created some weird accidents of nature which are true to neither the TQ or the antecedent philosophy.

4. Training for Total Quality must cover more than an understanding of the philosophy and its tools. It must include the whole range of training needs which already existed before TQM and which require even more attention in a workplace of empowered workers. Unions have always been sensitive to these training needs and they need an expanded role in this regard.

If any of these factors is missing, Total Quality may be headed for the rocks.

One more thought - Emerging from an age in which individualism was king, it is difficult as well to understand the new dynamics of team building. Is it any wonder that unions are feeling threatened?

In June, 1993, the United Nurses of Alberta released a 175 page report entitled simply *Total Quality Programs*. Under the title there is a cartoon of a man with shirt and tie (the manager) yelling gleefully *More Work for Less Pay!*

It is interesting to note that several elements which TQ managers take pride in as both useful and empowering are viewed negatively by the UNA. Multi-Skilling and Cross-Training for instance, rather than being seen as a way of providing workers with more skills and thus more interesting jobs, is seen as a way of reducing job classifications and pay differentials as well as deprofessionalizing skilled workers. Continuous improvement, Kaizen, is seen as referring to speed as well as to quality. Not just "work smarter" but "work faster".

In their book Putting Total Quality to Work, Marshall Sashkin and Kevin Kiser ask "What about the Union?" They indicate that "in fact, union-management committees set up to guide the implementation of TQM often do not give the union equal weight in decisions." They go on to say that "trying to get around the union, reduce its power, and perhaps even eliminate it are actions inconsistent with TQM. Such actions make it impossible to create a climate of trust and may actively promote a climate of fear." (5) Their conclusion is that it is important for unions and management to be equal partners.

It is evident from a review of what has been written on this subject that many unions do fear Total Quality. Some of their fears appear to be well founded. Others seem to be based on emotion and an unwillingness to see their mission and mandate evolve to serve the needs of a very different age. Whether one accepts or rejects the point of view of these unions, one thing is clear. Knowledge of how union leadership views Total Quality is an essential background for any education service provider who wishes to gain access to a workplace which is implementing or on the point of implementing the new philosophy.

Resistance to Total Quality implementation is natural and reflects the complexity of the issues surrounding the Quality philosophy. The whole world seems to be redefining itself these days, as it always has, century by century. Otherwise, humankind would still be living in caves.

> Redefining Total Quality is part of the modern search for meaning and change. The challenge is for unions to take back the words "Total Quality" and redefine them according to their members' needs as workers and as citizens.

Other Dissenting Voices

While trade unions are commonly perceived as the loudest dissenting voice to Total Quality, there are others as well - some of them found in the education and governmental communities. One funder of literacy programs remarked that she was interested in Total Quality because she wanted to examine barriers which prevented educators from entering workplaces to set up literacy programs. I thought it was interesting that she saw Total Quality as a "barrier to access" rather than as an "opportunity to contribute in a highly relevant way". Another literacy funder said that she thought some educators would not be interested in knowing more about Total Quality since they would view Total Quality as being an outside factor, having nothing to do with their literacy and numeracy curriculum. Indeed. there was almost an insinuation that Total Quality was just another fad which could be disregarded.

What is troublesome about this is that these statements do not pay cognizance to the culture change that takes place in TQ workplaces. I spoke to an educator recently, involved in workplace education, who told me he spent one module of his class dealing with "how to speak up and be assertive with your supervisor, how to make a point without seeming like a complainer". I view that as serving the old paradigm, based as it is on a traditional hierarchical management model in which the worker is servile to the supervisor. In the new paradigm the class would focus on how to forge a new link with supervisors - how to take responsibility for one's actions now that responsibility rests with the person doing the job, how to problem solve on teams in a context in which you and your supervisor are equal participants seeking continuous improvement... In other words, less of a focus on getting along with the supervisor, and more of an emphasis on showing how the process can be improved (the real way to impress the supervisor anyway.)

The answer to persons who feel that Total Quality is an insignificant part of the workplace is simply this. Total Quality is growing rather than fading. While it has failures as well as successes, it is becoming an increasingly important part of management and organizational development. This can be seen by the increasing interest and membership in societies such as the American Society for Quality Control (ASQC) , the Association of Quality and Participation (AQP), and in interest in the Baldrige and Canadian Awards for Business Excellence (CABE). The founding of the National Quality Institute in Ottawa shows the trend.

Factoring in Positive Views

Despite the visibility of union opposition to TQ there are many examples of partnerships between unions and management. BC Tel senior management invite the Union President and Vice President to the Monday morning corporate meetings. In another organization, an education institution, the union has been actively involved in TQ training. A skilled tradesperson in the maintenance area has already seen improvement. *"It used to be you had to go through all kinds of paper work and several managers just to change a light bulb. There were delays and everyone was angry. Now, we see the need and we just do it."*

A front line worker at one company indicated to me that Total Quality has brought about an improved working environment in the service area. He saw this as being particularly evident in the responsibility given to employees making service calls. Because employees are empowered to replace faulty equipment, delays for approval at the service-manager level are avoided.

A hospital union spokesperson I spoke to said that she could see some positive aspects to TQ. She was concerned, however, that there was not consistency in its implementation. Many workers who attend TQ training sessions feel intimidated because of their basic skills level. They do not mention it, however, and pretend to understand the many charts and graphs which are presented.

To sum up, it appears that some opposition to TQ is not opposition to TQ at all. Rather it is fear of being placed in an unfamiliar situation, either as a trainee or as a worker. The multi-skilling aspect of TQ is particularly difficult for low skill workers to take. If the union takes a stand against multi-skilling on a philosophic ground, it is easier for workers to oppose all aspects of TQ. Unfortunately, such opposition does not help workers improve their skill levels so that they can operate in more diverse functions in the company. The result may be an advantage for workers in the non-unionized work force who will be more flexible. This issue will need to be addressed if the trade union movement is to remain viable and relevant.

CHAPTER 3 INTEGRATING BEDROCK SKILLS INTO TECHNICAL TRAINING - THE TQ CONNECTION

This chapter will be of particular interest to learning professionals. However, corporate managers should also find some food for thought. Managers who have a good understanding of the linkages between bedrock skills and technical training will be better able to assess human resource and training needs within the organization.

An Elusive Wish

Integrating bedrock skills such as literacy and numeracy into technical training has often been more of a wish than a reality, even though considerable lip service has been paid to the concept.

There have been several problems preventing true integration from occurring. Three key questions may be asked.

1. What exactly is "integration"? (There is debate over what is meant by the term.)
2. Who is responsible for carrying it out?
3. How does it relate to other training being offered?

This third question is especially relevant in a Total Quality workplace because a new element has been added. Not only must the literacy/numeracy training be integrated with technical content - it must also be integrated with the philosophical underpinnings of TQ and all which that implies.

In *Basic Skills for the Workplace* (Culture Concepts, 1991), I have identified three models for workplace literacy programs, all of which are built on some form of partnership. My preferred model is what I have called in the past the Job Specific/Integrated Training Model. For greater simplicity and clarity I now call it the Integrative Partnership Model. I prefer this model because it provides an alternative form of basic skills training to the "stand alone" literacy class which is part of many workplaces.

> The Integrative Partnership Model recognizes the ways in which training expertise of professionals with different specialties can be a dynamic force. It does this by teaming the technical or trades trainer with a learning professional such as an adult educator.

What makes this training approach so special is that it is a highly strategic approach, based on both the technical trainer and the adult educator enriching each other's instructional capacity through new knowledge. Adding language arts development to technical content makes a thick broth. The technical trainer has great resources of information and expertise, but generally is not a literacy specialist. The adult educator, on the other hand, is a literacy specialist, but lacks the detailed knowledge of the technical aspects of trainees' jobs. Separately, each one has part of what is needed, while together they have it all.

I started thinking about the Integrative Model of basic skills provision long before I became aware of Total Quality. It is exciting to note, however, the way in which the Model fits the systems based aspects of TQ and the trend toward team building.

> In the old paradigm it was rare for technical trainers and learning professionals to collaborate. They might share the same class room space (sequentially); they might share the same lunchroom (concurrently); they might share perceptions of trainees (informally), but they rarely regarded each other as real partners.

Why Collaborate?

Research has shown that literacy gains are greater when tied to relevant content areas. That is why the opportunity for collaboration between the literacy provider and the technical specialist is so crucial. It is the essence of the integrative approach to training.

Making it Happen

Even after there is agreement that literacy and technical training should be viewed together rather than separately, there may be some confusion as to what to do next. Simply putting these two specialists together in the same room doesn't guarantee that anything different will happen.

But here are some knowledge areas in which the adult educator can display expertise.

(a) how to simplify workplace documents;
(b) how to demystify workplace terminology;
(c) how to read for a purpose;
(d) how to use context clues to gain meaning;
(e) how to use strategies for following directions.

These represent a sample only and comprise by no means a complete list.

It is very likely that the technical trainer has given very little thought to these tools of the literacy specialist's trade....just as the literacy specialist may not know a "theodolite" from a "bullfloat". (A theodolite is a surveying instrument. A bullfloat is a tool a cement mason uses to smooth newly laid cement.) Clearly, both have something to share with one another before they can teach or facilitate.

> Both the technical trainer and the learning professional should be looking at the integrative model as a dual opportunity - the opportunity to pool their two bodies of knowledge and the opportunity to seek TQ applications of that knowledge. *In that way, not only will the needs of the worker be served; so too will the organizational culture be strengthened.*

Let's look at each of these 5 elements from this perspective.

(a) Simplify workplace documents

Workers with weak reading skills often find manuals and code books terrifying. The very appearance of the Manual may provoke fear and loathing - especially if no one has taken the time with the trainee to explain the various parts of the document. Explaining the various "help" features will be important - the purpose of the Table of Contents, the Index, the Chapter Headings and Sub-headings, the Chapter Summary, if there is one, and the Glossary.

The technical trainer may not be fully aware of the dilemma faced by trainees who do not have good skills for finding their way through a document. This is where the literacy educator can be most helpful. In cases where a glossary is absent, for instance, the educator can assist the technical specialist by showing how trainees can be encouraged to build their own glossary. This channels attention on vocabulary as well as on key concepts. The technical trainer will also have expertise to contribute to the literacy educator by pointing out which words and concepts have been most problematic for trainees in the past. Armed with this information, the literacy educator can now make an analysis of any patterns emerging from these difficulties. It may happen, for instance, that trainees are having most difficulty with words with Latin or Greek parts. The word "polymer" illustrates both the situation and the example! * (polymer means "many" (poly), and "parts" (mer). The prefix and the root are of Greek origin. Once the trainees know the meaning of "poly" and "mer", they will be better able to decode related words such as "elastomer" and "polygon".)

Quite often educators accessing the workplace for the first time are shocked by some of the materials being used in the training workplace. Often manuals have been written by engineers or other highly educated specialists. Often they have been so intent on the content that they have given little attention to form. Even something as simple as having a good proportion of white space on the page can make a difference in readability. The Plain Language Movement has begun to make a difference here but all too often texts are still too dense to be attractive. I use the word "attractive" here in the original use of the term - not meaning simply appealing and pleasing, but meaning "drawing towards oneself".

> The use of drawings, diagrams, charts and flow charts create a special opportunity for trainers, especially in a TQ workplace. The high use of statistical tools in a TQ workplace means that workers at all levels will be faced with control charts, histograms and a variety of graphs. Whether charts, graphs and other diagramatics are used for the purposes of SPC or for job content such as plumbing or electricity, there is a plethora of concepts to be explained and explored. Workers who left school early may never have been presented with the principles of reading graphs and charts. Never assume that this knowledge base will be there simply by osmosis. This is true especially of flow charts with their very specific codes.

(b) Demystify Workplace Terminology

Often the technical trainer has been around his or her content area for so long that terminology has come to fit like a second skin. This may present problems for trainees. The literacy specialist as an outsider to the content area will quickly recognize jargon. Incidentally, did you know that the original meaning of "jargon" is birds twittering? From there the word went on to mean "unintelligible or meaningless talk or writing." This meaning flows naturally from the sounds of the birds which are unintelligible to humans. A later meaning applied the word "contemptuously to the language of scholars, the terminology of a science or art, or the cant of a class, sect, trade or profession." This latter meaning is dated as coming into the language in 1651, around the time that guilds of tradesmen, the forerunners of our modern trade unions, were growing and flourishing.

Despite the pejorative overtone of the word "jargon", many workers are proud of the special vocabulary which marks their trade or technical specialty.

> **Often jargon comes to us with rich historical overtones, some of which has been lost in time unless we go back to look for it.**

Learning professionals such as literacy educators may know little about the trade, but if they can contribute information on how the job jargon developed, respect for their expertise will be enhanced.

Let's take for example the word "darby" which in the masonry trade refers to a two-handled plasterer's float used for levelling surfaces. This meaning surfaced (no pun intended) in 1819. The key to the meaning is in the "two-handled". An earlier meaning of Darby appeared in the 1773 expression "Darby and Joan", referring to an attached couple, especially when old and in humble life. In days when fireplaces were the main source of heat, china figurines at the hearth were often called Darby and Joan. And tracing "darby" back further, we find the 1576 slang for handcuffs, once again with the image of "double." Many jargon words have a similarly fascinating and obscure origin, and often discovering it is as close as a dictionary.

Besides pure jargon, there is the related subject of trade homonyms - words with one meaning within the trade and another in ordinary life. The word "magazine" will convey one thing to the layman and another to someone dealing with explosives, just as the word "apron" will mean one thing to a cook and another to a carpenter. Identifying words of this nature and exploring the meanings will add interest to vocabulary development. Did you know, for instance, that the word "magazine" for explosives and "magazine" for readers have something in common? The meaning of magazine as a storehouse for gun powder was developed in 1596. In 1802 the concept was extended to "a storehouse of information."

(If you are wondering what usefulness it is to have a better understanding of the meaning of words, think back to some of the words which were mysterious or useless to you as a child. I know, in my own case, I was mystified by the word Bauxite which was on almost every list of exports mentioned in geography class. It was only when travelling in France at les Baux and inspecting its rocky promontories that I came to understand the origin of this mineral source for aluminum.)

> **Gaining fuller meaning from an examination of jargon will be especially helpful for workers with ESL needs since they will gain a more holistic understanding of language.**

(c) Show How to Read for a Purpose

People who are effective readers rarely stop to analyse why this is so. Learning strategies are gleaned at an early age and from diverse sources, so it is difficult to think back to just how we developed our reading skills. Good readers do exhibit a number of common characteristics, however, and by understanding the complexities of these characteristics, it is possible to unlock doors for those persons who still find reading difficult.

Characteristics of Good Readers

- Good readers know how to **skim and scan** a document to get a general idea of what it is all about before going into it in detail. They know how to react to all the visual stimuli in the text - ranging from **headings and sub-headings, to diagrams, charts, graphs, photos.**

- Good readers know how to **use the structure of a document** to advantage - they know that the **Table of Contents and the Index** will provide a useful method for discovering desired information.

- Good readers use the knowledge gained from the points indicated above to narrow down the purpose for reading a particular document, either in whole or in part.

The reason *why* you are reading a document will shape *how* you read it.

If you are searching for one particular detail for general information only, skimming for key words will be useful. If you need comprehensive information to perform a complex task correctly, you will want to read more sequentially and with greater concentration.

Learning professionals will be able to deepen the technical trainer's knowledge of how people read by reviewing the many aspects of reading theory and practice. Getting trainees accustomed to critical thinking as they read is essential. Poor readers often don't challenge the text. Good readers, on the other hand, will know when a piece of information could have been further elaborated and will enquire how to gain further detail.

While technical trainers may have had some training in Learning Styles, they may not have focused on how learning styles affect reading and writing. This will be another area where the educator can assist.

Modelling "cause/effect" and "compare/contrast" exercises from a technical text will show how comprehension can be improved by such means. Even something as seemingly simple as locating main ideas and learning how to reformulate information in one's own words may provide the technical trainer with new tools to use when teaching technical content.

(d) Help Workers Use Context Clues to Meaning

Vocabulary is made up of prefixes, roots and suffixes, all of which contribute substantial clues to meaning. Workers can be trained to use these clues to unlock meanings which would otherwise be elusive. Let's take the word "telemetry" for an example and assume that for most trainees it is a heretofore unknown word in a technical text. Workers can learn how to make word parts "speak" to them by moving from the familiar to the unfamiliar. It works in this way. The reader may not know the word "telemetry" but he does know the word "telephone" and "television". A brief pause to reflect will lead the reader to the conclusion that TELEvision is pictures coming from a distance and TELEphone is sound coming from a distance. Likewise, even if the suffix "metry" is not understood, the reader may understand the word "metric" and "metre" and conclude that this has something to do with measuring - thus "telemetry" involves measuring distance. (A

telemeter is an instrument for ascertaining the distances of objects and telemetry is the process for doing it.)

> Substantial vocabulary enrichment can occur through building capacity to analyse word parts. This can be important in a Total Quality workplace where a greater degree of reading and writing may take place because of the demands of identifying and tracking continuous improvement.

(e) · Highlight Strategies for following directions

Sometimes directions for carrying out a function are not described succinctly in a manual. If a great deal of related but basically background information is interspersed with the "how to" steps, workers may have difficulties using the text as a guide. If workers are helped to understand words of time, place, direction and action they may be able to cut straight to the core of the directions. Often poor readers tend to focus on the biggest, most difficult words, missing some smaller words which may be equally or more important to determining meaning.

Take these Design criteria, for instance, for roof waterproofing material:

> "Design B - Elastomeric sheets are loosely laid over an unsecured approved insulation or other suitable surfaces" "Design C - Elastomeric membrane sheeting is installed under moisture resistant insulation which provides physical protection for the membrane."

> In concentrating on the larger words such as "elastomeric" "membrane" and "insulation", the inexperienced reader may miss the fact that as far as carrying out directions are concerned, two of the most important words here are "over" and "under".

Grasping that fact immediately will make carrying out directions easier. The literacy practitioner may take several manuals in use and highlight for the technical trainer where these important but easily missed words are found. Once this highlighting has been done several times, the technical trainer will be able to do that quite naturally himself or herself.

Using the Integrative Partnership Model

Before the Total Quality movement came along the Integrative Partnership Model was experiencing some problems. Indeed, by and large it was ignored, with some notable trail blazing exceptions. A major problem was getting the partnership going between the adult educator basic skills practitioner and the technical trainer. Often each seemed to see his or her area of expertise as linear. Basic skills instructors often didn't take the time to delve deeply into the workplace content areas, preferring instead to use generic materials; in like fashion, the technical trainer did not give much thought to reading strategies as being identifiable and tools for accelerating reading and problem solving capacity. A reader was simply a good reader or a poor reader and that was that! Moreover, there was sometimes a sense of competition between these two trainers, each

having a feeling that the other just didn't understand - and, since they rarely talked to each other beyond coffee time pleasantries, this feeling persisted.

Total Quality management has the potential to change all this - but has done so only to a limited degree for the following reason.

> Many companies have not yet seen the vital link between "bedrock skills improvement" and "continuous improvement" of processes and services. Training has tended to be training in the philosophy and tools of TQ without looking at solidifying the base on which all implementation of the tools will stand.

Once the case for this solid base has been made, accepted and added to the TQ modus operandi, then the Integrative Partnership model will enter into its heyday. I can't emphasize enough the importance of the sound foundation. Remember the learning pyramid we talked about in Chapter 1? Without the sound foundation provided by the bedrock skills, other skill areas may be mired in quicksand.

Requirements for Success

For the Integrative Partnership Model to succeed, a number of conditions need to exist.

> Both the technical trainer and the learning professional must be ready to accept input from the other. This means that there must be more than perfunctory respect for the other's area of expertise.

The technical trainer must be ready to accept input from the educator. He must realize that the educator's expertise will improve instruction and that for this to happen he will need to provide advice and feedback to the educator on technical content matters and on the curriculum. He must also be creative in adapting new expertise to instruction. There really is a need for the two streams to merge rather than to follow parallel courses.

Similarly, the educator must show respect for the technical trainer's knowledge and experience. This should come quite naturally but may require some educators to appreciate the diverse backgrounds of technical trainers, some of whom have gleaned their expertise from experience rather than through formalized higher education.

The educator will need to build an information base about the workplace. This can be done partly through discussions with the technical trainer and with managers and selected workers. It can also be done through a formalized Organizational Needs Assessment and Literacy Task Analysis. Details of both are found in *Basic Skills for the* Workplace, Taylor, Lewe, Draper, Culture Concepts, 1991.

Meeting with the technical trainer will need to take place as often as necessary - probably quite regularly at first. A particularly problematic aspect for some basic skills educators will be

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being able to "let go." While the partnership between these two experts is equal in many ways, generally it is the technical trainer who will be doing the major share of the instructing.

If you are wondering how it is an equal partnership if one partner is doing most of the instruction, think of it this way. In the Indy 500 it is the race driver who drives the car but it is the mechanic in the pit stop area who changes the tires and does other emergency service who keeps the car on the road and contributes massively to the difference between victory and defeat.

CHAPTER 4 - STATISTICAL PROCESS CONTROL (SPC) AND THE QUALITY TOOLS

Introducing the "Quality" Tools

For many learning professionals, their first entrance into a workplace takes place when a company identifies the fact that workers are unable to benefit from training offered in Statistical Process Control. In a sense, SPC has caused the same kind of realization of literacy upgrading needs as the introduction of WHMIS legislation did several years ago. When the obligatory training began for the Workplace Hazardous Materials Information System (WHMIS), managers were horrified to see that many workers could not read sufficiently well to find the page the instructor was on in the workbook or to read simple headings. The frustration that managers felt then resulted in a number of pleas for help in locating remedial education. It is the same for SPC - but unless adult educators understand the background of SPC, the reasons for it, and the expected changes it is to bring about, they can offer only the most perfunctory training.

The difficulty occurs when educators (or others) think of Statistical Process Control only as a statistical tool. It is indeed that - but it is much more. It is part of the transformation philosophy of Total Quality Management, and as such, the Statistical tools are called into play to bring about continuous improvement in processes. It all goes back to that keystone of Total Quality, customer satisfaction. If products are to be produced which are long lasting and well functioning, the process of making them must be as free of defects as possible. The old idea was "inspection", but the problem with inspection is that it took place after the damage was already done and did not lead in any significant way to improvement of processes. Companies came to accept defects as a natural part of the business rather than as something they could change or fix.

Dr. Deming first introduced Statistical tools to Japanese industrialists in the early 1950s, starting with the key concept of control charts to track variation of machine operation or processes. He considered it important that companies be aware of the capacity of their systems. Other tools soon followed. There are now 7 recognized key statistical tools and another set known as "the New 7".

Using the Tools to Promote Holistic Learning

Not every workplace will use all the tools. Their relevance depends on the product being made or the service being delivered. It is probably correct to deduce, however, that several of the major statistical tools will be appropriate for almost every modern workplace. A workplace learning professional will need to be aware not only of what tools are being used in a particular workplace, but what their intended uses are. This second point is key, since without knowing how the statistical tools will affect processes, all teaching about them will be mechanistic and lacking context. Indeed, it will remind one of the situation in many schools where students tune out because they can't see any relevance in the instruction which they are receiving.

SPC will present problems for some educators for several reasons. First, some of these the statistical tools require a holistic approach - integrating word problems, visual clues, and numeracy all in one. The "You teach the math and I'll teach the language." approach will not really work too well in a situation where all the competencies are intertwined. This is the challenge facing educators.

Statistical tools may not have been highlighted in their own education. This means that they will have some learning to do themselves before attempting to teach others.

> The statistical tools require a holistic approach - integrating word problems, visual clues, and numeracy all in one. The "You teach the math and I'll teach the language." approach will not really work too well in a situation where all the competencies are intertwined. This is the challenge facing educators.

This book does not purport to teach SPC. Its goal is, however, to present the tools, their main uses, and provide guidance about where to find out more about them.

The Tools In Brief

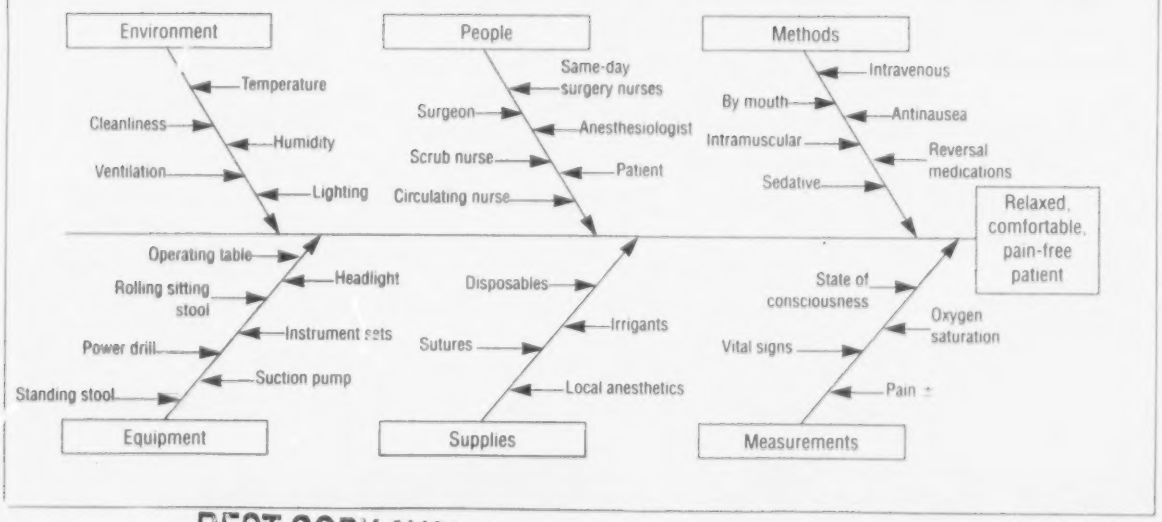
Here are the statistical tools, and a brief description of them adapted from *Kaizen*, by Masaaki Imai.

1. Control charts - Control charts track variation in a process, distinguishing variation which is normal or common from that which is attributable to a special cause. These charts have control limit lines at the top and the bottom, and trend data is plotted in dots along the chart. The control chart is the most common SPC tool.

2. Histograms - Histograms are also well known. These show the frequency distribution of a sample of measurements from a process. They take the form of a bar chart. The shape and the nature of dispersement on the chart will highlight problems in a process.

3. Cause and effect diagrams - Because of their appearance, these are also known as "fishbone" graphs, and are used to analyse factors contributing to processes or situations. These tend to use words rather then figures. Since these really need to be seen to be understood, here is an example.

Figure 3. Cause-and-Effect Diagram: Patient Pain



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4. Pareto diagrams - These take a bar-chart form, and display problems according to the cause or type, such as categorizing reasons for automobile tire failure (tread separation, blowout, initial defect, faulty valve, excessive age and use, etc.)

5. Graphs - Graphs come in a variety of forms - line, bar and pie.

6. Scatter diagrams - These may look a bit like the "connect the dot" puzzles we played with as children. The relationship between the dots helps to analyse the data. In a scatter diagram one plots the incidence of two different variables. For instance, on one axis, one could place a structural member under tension such as metal beam, and plot the mean time to failure on the other axis. Knowledge of regression analysis and standard deviation is necessary in order to interpret scatter diagrams.

7. Check sheets - These sheets track results over a period of time.

The New 7 tools are used less commonly than the original 7, and are particularly useful in situations where data is not easily available, and yet where decisions are necessary. New product development is an example of where data may be lacking.

The New 7 are:

1. Relations diagram, which clarifies factor interrelationships;

2. Affinity diagram, a brainstorming method, which groups participant's ideas by subject matter;

3. Tree diagram, showing the interrelations among goals and measures;

4. Matrix diagram, which breaks quality requirements into engineering and production characteristics;

5. Matrix data- analysis diagram, a modification of the matrix diagram;

6. PDPC (Process Decision Program Chart), used to reach optimum conclusions

7. Arrow diagram - used in Critical Paths to show steps necessary to implement a plan.

The learning professional may find the Affinity Diagram useful in dealing with the team building aspects of the Total Quality philosophy. Since it calls both for writing down and grouping ideas, it can be used as a means of building problem solving capacity. If the Affinity diagram is used as a common method of addressing new content areas, workers will find it less intimidating if it comes up in other contexts.

The Arrow Diagram may also be in common use in many workplaces, with many employees being expected to at least understand it even if they aren't involved in preparing it. The trainer will want to keep in mind that his or her role will cover three major dimensions - making sure trainees understand the concept, that they be able to interpret a completed chart, and only sometimes that they be able to produce the chart themselves. It will be important in the planning and needs assessment phase for the trainer to clarify which employees are expected to do what in regard to these three dimensions.

Which Tools to Use?

It is unlikely that the majority of employees will be exposed to all of the New 7. A bedrock skills service provider should not feel overcome by the need to learn all the tools. What is important, however, is to discover *which* are being used in the particular workplace, for what purposes, and particularly by which workers. It may be that some of the tools are used only in a very specialised way by a small core of employees.

Using Real Life to Clarify Statistical Concepts

Since statistical thinking may be new to many employees, it will be helpful in the beginning for the learning professional to make a gradual transition from concepts to applications. It may be useful to get the class to probe real life experiences where knowledge of variation was important. Dr. Deming's oft quoted example of Patrick Nolan and the School Bus Driver can be a good start. The story basically is this. Patrick's school bus picked him up at almost the same time everyday. He was supposed to be picked up at 8:00 a.m, but sometimes it was 8:01, 8:03, 8:05. Generally the variation was small, ranging from one to five minutes. On two days, however, the bus was really late. On one day it came at 8:30 and on another at 10 to 9. It turned out that there were special causes for the lateness - once, the bus door was broken delaying the pickups; the other time there was a new bus driver that didn't know the route. This can be plotted on a matrix to show clearly the natural variation, said to be variation by "common causes" and the extreme variation, said to be variation by "special causes".

This is a good opportunity to point out to the trainees that variation is natural and that there is no reason to try sudden corrections for something which is going to vary anyway. Extrapolating this to the context of the workplace, employees may be able to see a parallel to their own production. I may have produced 20 widgets today, 18 yesterday, and 21 the day before - but that is probably within the realm of common, natural variance. It is only when I get to a situation where I produced 6 or 9 - something quite far removed from the norm, that I need to look at the causes. Otherwise, I have a stable system which is said to be in statistical control.

At this point, trainees can explore why it is important for workers to see the difference in variation from common and special cause. Looking back to our example, the first problem - the broken door - can be fixed by maintenance; in the second - the new driver - by training.

> Workers can then be encouraged to look at parts of their own work where they may have variable production. Then they can track it themselves for a few weeks to see if the variation looks natural or whether there may be special causes. Once special causes are identified, this is a really opportune time to problem solve. What is needed to reduce the uncommon variation - training? maintenance? replacement of equipment? examining time utilization?

Another tool can now come into play - *brainstorming*. Once the special causes are identified, what range of solutions may be appropriate. The brainstorming technique requires some reading and writing skills, as well as the ability to categorize and analyse ideas. The trainer/facilitator can show that good analysis can take place using a few words and simple headings. This can be comforting to workers who find reading and writing difficult.

The *fishbone diagram* which emerges from brainstorming exercises also is a natural for continuing the problem solving process. It is relatively easy. The quality director at one hospital which I visited said the fishbone (cause and effect diagram) was the first one that newly formed teams used, since it is less intimidating than some of the more graphic tools. She also emphasized that at the hospital, no tool is introduced unless it is in context. A context is established - a tool explained and then applied in the very setting which is being discussed. The tools are thus immediate and relevant.

> Because of the need to connect tools to immediate and relevant situations, it is essential that educators go into the workplace ready to examine contexts and applications. It is no longer sufficient for an educator to go into a workplace fortified with adult education techniques and some content materials based on a pre-determined curriculum. The context must emerge from the workers' jobs and the ways jobs connect in the system.

This need for connectivity makes it even more relevant than ever before that educators have a good grasp of what kind of skills are embedded in workers' jobs. A thorough Needs Assessment and a carefully crafted Literacy Task Analysis will be an excellent prelude to developing an approach to integrating essential bedrock skills with Total Quality practices.

CHAPTER 5 - ADDING ISO (International Standards Organization)

Companies which have added ISO 9000 to their quality journey will have an even greater need for employees with excellent bedrock skills. ISO 9000 is a quality certification process first developed in Europe to determine product quality in the Common Market trading area. It is increasingly becoming important in North America for all companies which wish to trade abroad. On a recent trip to Toronto I saw a huge banner with "ISO 9000" emblazoned across the side of a building. This was one company's way of letting its immediate world know that it had completed the stringent audit process necessary for certification.

It is the preparation for the stringent audit process which creates a demand for excellence in reading and writing skills. ISO 9000 requires that standard practices be flowcharted. This often will involve the work being done by line workers, who may be asked for very specific detail of the job. For workers with low basic skills the need to document the job may be intimidating. Even more so will be the subsequent analysis of improvements, which must then be documented into a Manual. The Quality Manual is the Bible, itemizing and describing standards which the company must meet to obtain and keep certification from an ISO Registrar. While experts in ISO 9000 requirements will guide the process, many workers will be drawn into it, some unwillingly.

> Just as WHMIS legislation had the unplanned effect several years ago of identifying employees with weak basic skills, so ISO 9000 does today.

What does ISO 9000 mean for learning professionals? They will want to find out before beginning a workplace program if the company is doing ISO as well as TQ. If that is the case, they will want to review some general information about ISO 9000. The aim will be to assess the degree to which employees are required to flowchart and describe their job, identify trends, chart data, or itemize customer feedback for the ISO documentation. ISO 9000 courses are available, but may be considered too expensive for some educators. Fortunately, there are some excellent resources around. One, ISO 9000, Meeting the New International Standards, by Perry L. Johnson, is almost a primer on the subject.

Making Sense of ISO

What do you think of ISO 9000? That's a question which is bound to lead to some interesting answers. Respondees will fall roughly into three groups: those who have never heard of it and think it's a Baskin Robbins flavour, those who know what it is but think it won't affect them, and those who know what it is and are indeed implementing it or on the verge of doing so.

For those readers who are thinking of 9000 icy flavours, a definition of ISO 9000 may be in order. It is, of course, the set of quality standards developed by the International Standards Organization.

> The International Standards Organization's members are the national standards bodies of 105 countries. Although standardization has had a long life, the 9000 standards were not established until 1987. Simply stated, ISO 9000 provides a way to measure the quality of a *process*. It is not the way to measure the quality of a *product*.

Confusion between these two aspects has been responsible for the fact that ISO 9000 has foundered to some extent, particularly in the United States.

Why would a company want to be involved with these standards? It all has to do with international competitiveness. ISO 9000 has become the accepted basis for quality systems requirements in the global marketplace. In Canada, Chemical and Allied Products, and Electronic Equipment (excluding computers) lead the way in becoming ISO registered. Ontario, Quebec and Alberta are the most active, with Ontario accounting for over half of the Canadian registrations (CMA, 1994). Nevertheless, the total number of companies registered in Canada is fairly slim - 747 companies according to 1994 figures.

In September, 1994 I attended the Toronto ISO 9000 Forum, an international gathering, in order to better inform my research on Total Quality. While I do not claim to be expert in the complexities of ISO, I do have some views on the subject. ISO 9000 appears to be on the brink of gaining significant momentum. Like a new baby, however, its teething pains are still in evidence. Here are some of the pluses and minuses as I see them.

POSITIVE:

- ISO 9000 gives structure to a Quality program. Some organizations need structure to ensure that their quality initiatives do not meander.

- ISO 9000 builds on the expertise of quality professionals in many countries and in many organizational milieus. The fact that it started in Europe, with the large European market in mind, shows its capacity to transcend national boundaries in a search for quality standards.

- ISO 9000 calls for documentation of processes, and at least theoretically, the involvement of all workers. If properly carried out, it thus reaches down in the organization, ensuring that process improvement is within the orbit of all.

- ISO 9000 is concise - relatively that is. Its limited number of pages is eyed with envy by bodies such as health care accreditors whose quality standards are measured in tomes rather than in pages.

- ISO 9000 is environmentally friendly. Environmental protection stands tall among its quality indicators. Establishing and maintaining good environmental management has become a priority and a new standard, 14001, reflects this.

NEGATIVE:

- ISO 9000 registration is expensive. Even with efforts at price reduction through group registration, it may be outside the scope of small companies - and it's never really finished. Update audits are required every few years, at an additional cost.

- ISO 9000 can be confusing. Various standards - 9001, 9002, 9003, 9004 - exist. There is sometimes disagreement about which standard an organization should strive for.

- ISO 9000 is bureaucratic. It is the Dreadnought of the Quality movement - large and powerful but slow to turn and react.

- ISO 9000 puts time pressures on organizations, causing some to place more emphasis on "getting it done" rather than on "getting it done right."

- ISO 9000, like some of its quality cousins, may not actually reach to all levels of the organization. That would be the case, for instance, if some workers did not actually document their procedures, but had it done for them by workers or consultants more skilled in documentation.

So there you are - five pluses and five minuses. You'll have to figure out which list says the most to you. Now - some more detailed background and some frequently pondered questions.

What is the purpose of the standards?

Much has been written on this topic. A succinct description appears in Guidelines for Implementing ISO 9000 Quality Management Systems in Public Sector Organizations (Canadian General Standards Board, 1994).

> *"The ISO 9000 series Quality management standards are not product related. They are not standards like those that specify what the thermal performance should be in insulation or what characteristics gasoline and diesel fuels should have. Instead, they suggest practices that require management attention to ensure you address the needs of your customers in an organized and consistent fashion.*
>
> *The essence of the ISO 9000 series is:*
> *- Identify who your customers are.*
> *- Understand what your customers need.*
> *- Say what you do and how you do it.*
> *- Do what you say.*
> *- Measure whether you are meeting your customers needs and whether you are doing what you say you do.*
> *- Act on the new information to improve your organization."*

An expert's view of ISO

" Many have turned to Quality Assurance as representing an internationally understood common language of quality for their company, and, in this respect, we could qualify the ISO 9000 series of standards as the "Rosetta Stone" which enables each potential customer to establish a "lingua franca" with his suppliers. Certification has helped to do away with the need to translate quality into each customer's own "language".

Olivier Peyrat, Managing Director
Quality Assurance Association of France

Some Questions and Answers About ISO 9000

Q. How did ISO 9000 get started?

A. It started with the European Economic Community's need to be able to speak the same language of Quality when dealing with European Common Marker issues. Oliver Peyrat's comparing ISO to the Rosetta Stone takes on added meaning when one thinks of countries as well as companies.

The first standards were issued in 1987, with revisions issued in July, 1994.

Q. Is ISO 9000 just for large companies in the manufacturing sector?

A. No - ISO 9000 has quite a reach. It includes the service area and small companies. It includes cooperatives, schools, swimming pools, leisure resorts, public transport systems and police training academies.

Q. What are the main advantages to becoming ISO certified?

A. An American industry survey provided this analysis of benefits.

Greater quality awareness/positive cultural change	40.6 %
Better documentation	32.4 %
Increased efficiency/ productivity and reduced rework	15.6 %
Enhanced intercompany communication	7.4 %
Other	4.0 %

Q. Is there any major problem with implementing ISO 9000?

A. The biggest may be coming to grips with the ambiguities in the standards. Some experts feel that it is not always adapted to specific groups, such as service. Standards developed for military and engineering situations may not be easily understood in the service area. Improvements in wording are the answer. There seems to be a growing focus on making the standards more user friendly.

Q. Could ISO 9000 be described as empowering to workers?

A. You will get a different answer to that depending on whom you ask - and it will depend to a great extent on WHY the company or organization went to ISO 9000. Some organizations are truly committed to Quality and see ISO as the crowning glory to an initiative already well understood and well done. In such an environment the philosophy of TQ is probably well respected, and empowerment quite likely (although not assured). Some other organizations are going to ISO as part of a bandwagon effect, based on the premise that "if our competitors are doing it, we'd better do it too." Such organizations may be focusing on "paper" standards rather than truly having quality at heart.

Q. If a company already has a good quality system, based on continuous improvement of processes, why would it want to become certified?

A. Having a good quality system is essential to ISO registration. A benefit of ISO is that it continuously monitors quality implementation from a number of internationally recognized criteria. The fact that there is an external auditor brings a degree of objectivity to analysing one's quality effort.

Q. Is ISO 9000 growing?

A. Yes. It is growing dramatically. Dr. Lawrence Eicher, the Secretary General of the International Organization for Standardization spoke about that at the ISO 9000 Forum in Toronto in September, 1994. He referred to a worldwide survey showing that at least 45,000 ISO 9000 certificates have been issued to companies throughout the world - compared to only 26,000 nine months earlier. The current rate of growth is estimated at some 2,000 certificates per month, with the fastest growth being in the United States and Japan.

Q. I can see that right now being ISO certified may give one company an advantage over another - but what will happen when almost all companies get certified?

A. This is an important issue that the ISO leaders will need to think about. It may be comparable to the education field when a Bachelor of Arts degree , then a rarity, gave its holder an automatic advantage in the job market. The advantage quickly disappeared when BAs became commonplace. What will happen when ISO becomes commonplace? One can only

hope that the usefulness inherent in the process itself will have sufficient value to make it worthwhile on a continuing basis in the future.

CHAPTER 6 - CORPORATE AND NON-CORPORATE APPLICATIONS OF TOTAL QUALITY

John Deere and the Focused Factory - A Corporate Application of Quality

John Deere, Welland Works is a manufacturer of tractors and other farm equipment. It represents the Canadian division of a multi-national company, with headquarters in Moline, Illinois.

In January, 1995 I visited John Deere Welland Works to obtain a clear idea of their approaches to Quality. In many ways, John Deere was a natural choice for a visit. The Company name was very familiar to me, being located only 20 miles or so from my childhood home. I had grown up in a community which respected John Deere as a progressive employer. A holiday visit to family in the area presented a perfect context for extending my stay in the Niagara area another day so that I could fit in a plant tour and interviews with business, labour and Human Resource spokespersons at the factory. The visit, although a short 4 hours in time provided me with a great many insights into the ways in which this company thinks about and applies Quality.

Let's begin with a historical glance backward to John Deere, the man. Born in 1804 in Vermont, John Deere became a blacksmith and plow builder. The tradition of the time was that purchasers placed custom orders for their plows, which were then built expressly for them. John Deere, a philosophic precursor of Henry Ford, decided to manufacture a supply of plows for no specific customer and then market them throughout the West. Although the concept of Total Quality as we know it today had not yet come into being, John Deere's beliefs in Quality would be the envy of many a Quality leader today. He is remembered for one very compelling quote, which continues to be restated today - *"I will never put my name on a plow that does not have in it the best that is in me."*

John Deere firmly believed in the importance of local manufacturing, and that belief led to the birth of a Canadian site in 1908. Except for a brief period of closure of the plant from 1924 to 1931, the plant has been a fixture in Welland - or more properly Dain City - the municipality nestled on the shore of the Welland Canal, named after Joseph Dain, a one-time competitor to John Deere, and the man who first selected the site for the factory and ran it for several years before selling his operations to John Deere.

Like many other"Quality" workplaces, John Deere admits to having had several false starts. The advent last year of a General Manager committed to Quality has been instrumental in getting the latest Quality initiatives launched.

There are many key aspects of John Deere's Quality implementation.

- CQI teams have been set up to bring about process improvements in many different areas.

- The Just in Time (JIT) approach to production has been put in place, not only to reduce excess inventory, but also to ensure that a proliferation of defective materials does not build up. With small quantities prepared in advance, mistakes such as off gauge parts can be easily spotted and corrected.

- There had been a concerted effort to reduce non-value-added processes. Placing of operations in functional lines and joining two previously separate buildings into one has allowed parts to move through the factory without a great deal of to and fro movement by fork lift truck carriers. The view is that time spent simply moving product adds nothing to value but adds only to cost.

- Large machines such as presses which were awkwardly placed for the production flow have been moved, even though they may weigh a thousand tons. Over 60 large machines have been moved.

- Salaried workers have been placed close by to production workers so that they are always close to the action on the floor and can appreciate problems which may arise.

In addition to these production related changes, there have been two major organizational changes at John Deere which reflect the commitment to Quality. One is the move to the "focused "factory concept. The other is the "cellular" approach to production.

What is a *Focused Factory*?

> A "focused factory" is a mini-factory within a factory - a factory based on product rather than on function.

At John Deere in Welland there are three mini-factories within the factory - one for Gators and Wheelers, another for Front End Loaders, and yet another for Rotary Cutters. This is in contrast to the factory of five years ago which was organized by functions such as Engineering, Manufacturing, Marketing and Inspection.

What is the *Cellular* Approach?

> Cells are basically work units in which small teams of workers make entire products. The cell concept calls for a high degree of multi-skilling and a team approach to getting the work done.

Here's what a Globe and Mail article had to say about them in the Focus on Manufacturing section (January 7, 1995).

> *"In cell manufacturing, workers are divided into teams of between two and 50 employees grouped around the equipment that each needs. A single cell makes, checks and even packages an entire product or component. Each worker performs several tasks and every cell is responsible for quality. As such, cell manufacturing is the ultimate factory-floor*

refinement of other team-management techniques that Western companies have embraced in recent years."

A spin-off of the cellular concept is a greater concentration on training than in the assembly line approach. Indeed Compaq, a Texas based computer company, estimates its cell-based workers spend 6 per cent of their time being trained, compared with 4 per cent for assembly line workers.

There are over 45 cells in the John Deere factory, some comprising just one individual and others up to six workers. In cells, workers do more than one function. For instance, a worker will be called upon to be at the same time a press operator, a welder and an assembler. This is different from the old concept of narrow specialization.

Cells are managed with a non-invasive type of supervision. Workers get production quotas and instructions on-line by computers at their work stations. This allows the foreman to concentrate more on being an administrator and a coach/mentor.

Bedrock Skills in the Focused Factory

Training is mostly on-the-job training and in-house training. The John Deere Welland Works are in their third year of the Ontario Federation of Labour's BEST Program. BEST stands for the Basic Education for Skills Training program developed by the Ontario Federation of Labour. This program, a well-known peer tutoring model, works particularly well for workers at the lower end of the basic skills continuum.

Besides participating in the BEST Program, John Deere is interested in fostering more involvement from the adult education community, in order to ensure that adult education principles are well integrated into approaches to basic skills development. The teacher internship program, sponsored through the Niagara Peninsula Industry and Education Council, has strong potential for building stronger links between industry and education service providers. Through this program, a teacher observes a work area in the factory for several weeks in order to feed relevant content into courses being developed by the Community College, Niagara College. The courses are not specifically for John Deere employees but need to target the appropriate types of reading, writing, math and computer skills needed in the industrial sector.

At the time of my visit, John Deere was engaged in preparing a job analysis of all its 45 cells. The process has the support of the union, the Canadian Auto Workers (CAW) and is being coordinated through the assignment of an hourly wage worker. The idea of preparing a Job Analysis, focusing on the requirements of positions, is regarded much more positively by the union than a possible alternative approach - testing employees to find out their individual literacy profiles.

A Skills Profile Matrix is being prepared through the Human Resources Department, matching the skills which have been identified through the job analysis with the training required in that cell. Skills are broken down into Core Skills and Specific Skills. While this job analysis does not deal specifically with basic skills, it would be possible to overlay a basic skills profile, utilizing Literacy Task Analysis, a process described more fully later in this book.

Generous tuition reimbursement programs are available to employees, both in the salaried and hourly ranks, but participation from the hourlys is described as slow. It appears that a number of factors impede workers accessing upgrading opportunities. These include fear, production

schedules, shift work and peer pressure from co-workers who do not want to pick up the slack while a co-worker is off on training. The Human Resource Department is aware of the constraints, and is hoping to link up more strongly with the education community in order to jointly discover ways of promoting lifelong learning. In the meantime, higher education and technical skills requirements are being put in place for new recruits. Grade 12 plus one year's experience with welding is required for most positions.

> *What is the relevance of the focused factory and cellular manufacturing to educators?* Simply that they affect both the culture of the factory and the organization of work processes. This will be relevant in deciding what approaches to take in designing and implementing a skills upgrading program. Without this organizational knowledge, there is a possibility of preparing materials which do not reflect the way the factory actually runs. Being aware of the tightly knit cell approach will permit learning professionals to understand the ways in which cross-functionality and multi-skilling affect skills development.

The Red Schoolhouse - Total Quality in Education

While Total Quality had its origins in industry, it has moved to other sectors such as education and health care. Up until recently, educators have viewed Total Quality from an outsider perspective. Now, however, with the growing development of Total Quality concepts in the education sector, educators can look at the concepts as applied in their own familiar backyard.

There are various versions of Total Quality in Education. Some are self contained, seeing the bricks in the school house as their system's limits. Others reach out into the community to forge partnerships with business. Those who have taken the latter approach have done so with the knowledge that the business community has been involved in Total Quality issues for some time and will be able to give coherent advice. An attractive spinoff for education/business TQ partnerships is that they may actually lead to the principles being applied within a school. One school involved in such a partnership actually had students building clocks, repairing clocks and selling clocks in the school vestibule - a real example of putting the philosophy to work and at the same time developing entrepreneurial skills for youth. In most cases, however, Total Quality in the school has been less visibly oriented to business, and has concentrated instead on more education-oriented issues.

While the link between Total Quality and Health Care is in many ways a natural one, it is less easily understood in regard to education. In a hospital, one can see patients as customers for services provided by doctors, nurses, technicians and other health care providers. In the school it is less obvious. Is the student the customer? If you apply TQ principles, yes, the student is the customer, with teachers providing the service.

Such a concept is problematic for some, since it suggests that the student is the person who must be pleased and delighted by the service and the service provider, in this case the teacher. This has important implications for evaluation.

In some ways, the tables are turned, with the student in the driver's seat evaluating the effectiveness of the teaching rather than the teacher evaluating the effectiveness of the learning.

The trend is clearly moving this way, as is witnessed by the many university and college programs which have introduced student evaluation of teachers - a practice unheard of several decades ago. We need to move cautiously in this regard however. Dr. Deming has pointed out that it is really impossible for a student to judge the worthiness of a teacher till many years later when life experience gives the answer.

Here are some of the ways in which Total Quality principles are being translated into a school setting.

1. Form Cross-functional teams to deal with issues such as Curriculum.

   The team may include the superintendent, teachers, administrators, board members, parents - and if done right - students. The difference between this team and a pre-TQ team lies not just on who is there - but how they interact. The superintendent does not take the "leader "role but participates in the meeting as an "equal" rather than a superior to others. Titles are not used as team members address each other.

2. Use data effectively.

   Data is used to help administrators streamline processes, and to help students to track their learning.

Many processes are in place because "this is the way we have always done it." The "continuous improvement" approach to administration suggests that every process should be subject to re-evaluation to see if it continues to meet objectives. This could range from reviewing many office procedures such as the use of forms, methods of tracking attendance, purchasing and busing decisions, to food service in the cafeteria and the effectiveness of maintenance services.

Data can also be used to extend the scope of the traditional system - it may be, for instance, that two school boards will collaborate on a region wide basis in regard to the busing policy.

Students may be taught how to use data to track their own progress over a number of months. The move toward the "portfolio assessment" model rather than the traditional "teacher-given grades" model fits nicely into this framework. If students are provided the tools to track their own learning, they will have a finer understanding of variation and the concept of upper and lower control limits. This will assist them when they enter a workplace many years later.

3. Focus on the customer

When one talks to young people it is clear that they have much to say about the education they are receiving and the degree to which it satisfies or dissatisfies them. Often, however, they have little input in shaping the curriculum. (Their teachers have the same complaint, since curriculum is often conceptualized and designed by persons not actually working in the classroom.)

In 1992, the Canadian Advisory Council on the Status of Women sponsored a Symposium of adolescent women called "Widening the Circle - A Gathering of Young Women." The report "Young Women Speak Out" summed up the views of the over 100 participants. Schools came under particular fire, with the young women expressing frustration that they had so little control over curriculum content and the ways the material is presented. They also supported a peer approach to student counselling on matters relating to drugs, alcohol, emotional problems, and personal difficulties. It appears to me that, while the young women did not say it or possibly know it, what they were really calling for was a Total Quality approach to school - an approach in which the customers' voices are heard.

Perusing the Research

An interesting study on Quality in schools has been written by Peggy Siegel and Sandra Byrne. This book is available through the National Alliance of Business - the very organization which had first piqued my interest in this subject. The book, entitled *Using Quality to Redesign the School System,* tells the story of seven educational institutions in the United States who have used Quality to transform themselves into high performance organizations. All these organizations have used data to solve problems, have worked on continuous improvement of processes, and have moved toward team based decision making. All have developed a new definition of inclusiveness which adds parents and community groups to the former elite of staff and administrators. All admit they are still in the learning stage.

Another interesting statement on Total Quality in schools is the article by Armand A. Fusco in the May, 1994 issue of Quality Progress. In an article entitled Translating TQM into TQS, Fusco takes Deming's 14 points for management and translates them from a Total Quality Management approach to TQS - Total Quality Schools. Deming's first point, for instance, *"Create constancy of purpose for improvement of product or service."* becomes *"Think and plan for the long term and build the quality effort into school policies."* Deming's third point, *"Cease dependence on mass inspection to achieve quality."* becomes *"Teach everyone to evaluate his or her own work for quality as the work is being done."* And so on.

According to Fusco:

> *Perhaps the most important influence that TQM can have on education is forcing the leadership to focus attention on the system rather than getting caught up in micromanagement. This is why any TQM effort in education must start with the board of education. Business leaders and managers would be shocked by the ineffective way the board of education attempts to manage the system"*

An example of that appears close to home. A school board, anxious to put more money in its treasury, proposed charging teachers a daily parking fee for parking at the school. Most schools have large school yards and teachers had become accustomed to parking free - one of the few perks teachers get, since they have always been deprived of perks others take for granted, such as paid travel to conferences and the occasional business lunch. This action would take a toll - teachers, loathe to change the practice they have enjoyed, pressed for a parking lot attendant who would charge them only for the days they used the car. Others threatened to refuse to drive students to off-grounds events after school and would use school-paid taxi chits instead. A policy, therefore, which was intended to raise money would thus end up costing money - largely because the policy was not sensitive to the stakeholders affected and deprived them of contributing to the policy decision. Clearly, this ill-conceived plan cried out for a Quality approach.

While quality initiatives are found from kindergarten to university, community colleges are playing a pivotal role in applying quality principles. St Lawrence College provides an excellent example of Total Quality in action in the college milieu. Please refer to "**An Education Profile - St. Lawrence College**" in the appendix.

THE HEALTH CARE SECTOR

Many hospitals have begun to use Total Quality approaches, both in regard to their administrative and clinical processes. Some people think it is strange for hospitals to turn to Total Quality, an industrial model. However, there have been many catalysts for turning in this direction.

> Even though hospitals may be primarily viewed as services, they encompass all the elements of a business. Hospitals exhibit a complexity of organization which would send classical organization experts like Max Weber and Amatai Etzioni into a tailspin.

Also, like a business, a hospital cannot afford to operate in the red. As government transfers to the provinces for health care become ever more tight, hospital administrators realize that they will need to effect economies within their institutions if they are to survive financially and if their "customers", the patients, are to survive literally.

When I attended the Deming Seminar in Dallas in May, 1993 I was surprised at the large numbers of health care administrators and doctors in attendance. If I had been more versed at that time in the life of Dr. W. Edwards Deming I would not have been surprised. Several decades earlier, when Dr. Deming was recovering from a stab wound inflicted by a street assailant, he set his own individual stamp on the hospital just as he did with so many other areas of his life. Rather than concentrating on just getting better, he used his time in the hospital bed to analyze processes which needed improvement, ranging from the way nursing shifts were organized to the schedule for making a bed. This brief comment from Dr. Deming indicates the way his mind worked to seek improvements.

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"On another day, my nurse of the moment (R.N) came in three times between 8:30 and 10:00 a.m. to say that she would be right back to make my bed. I offered to get out of it so that she could make it straightaway, but she may not have heard me. Each time: "I'll be right back." Anyhow, near noon she came back and actually did the job. Of course, I'll live, bed made or no.

I wonder: Why is a registered nurse making beds? It seems to me that making beds is not a good use of her time. Her education and skills could be put to better use, so it seems to me. Are there not helpers to do this kind of work? But maybe there are reasons that I don't understand."

The "reasons" often turn out to be nothing more substantial than the bemused and slightly sheepish, "Oh, we've always done it that way." Those threatened by change might even mutter: "If, it's not broke, don't fix it.", to which one could reply, "It is broke - you just don't know it."

As hospitals have increasingly come under funding cuts, they have been more willing to examine less traditional ways of doing things. The possibility of streamlining processes offers substantial economies, as does the elimination of waste and rework. A particularly telling example was given to me by the Director of Quality at a prominent Eastern Ontario hospital.

"Looking at the impact of errors", he said, *"is particularly important in a large hospital. If 5 per cent of the dietetic trays in the hospital are wrong, it takes a lot of rework to make it right. This involves telling the supervisor, setting up a new tray, waiting for the elevator, bringing it up, and so on. It is estimated that 37 hours a week are required to follow up on a 5 per cent error in tray deliveries. That's equivalent to one full-time employee. We want to avoid rework and waste. Rework is a big concern. It costs money and the patient is not happy. A seemingly insignificant problem consumes a large amount of resources."*

This same Director pointed out that it is estimated that 30 per cent of patient time is spent waiting, a truly frustrating experience, but one which had been accepted for decades. Total Quality changes that. It changes the way you work.

"You have to look at all processes from a patient's perspective.", he said. *"If I were a patient...."*

The main aspects of TQ implementation at this hospital are:

- The customer defines quality.
- The process is preeminently important - not the result. If the process is improved, the results WILL be better.
- There has to be a culture that supports these ideas. This is done through looking across functions.

The Director of Nursing Quality also provided some insight into TQ implementation. Her advice for getting started with TQM?

> *"Warn people that there's a lot of jargon.*
>
> *Warn them that it's not a religion - it's a philosophy - a way of doing good business.*
>
> *Try to get away from the word "empowerment". Present it more as involving front line people in decision making about patients."*

She saw that old enemy "TIME" as the major pitfall in implementing Total Quality.

> *"It's time consuming. Patients are critically ill. It's hard to get nurses away from the bedside and onto larger issues. There are emergencies like cardiac arrest. There are now more acute patients - a nurse's time is not the same as it was 5 years ago. There therefore has to be creative planning and resources to support TQ."*

As sound as this advice is, many see strategic planning to be one of the main stumbling blocks in implementation. It is interesting to note that she used the word "creative" planning rather than strategic planning.

A recent article in The Harvard Business Review, (Mintzberg, 1994) outlines the problem:

> *"Strategies often cannot be developed on schedule and immaculately conceived. They must be free to appear at any time and in any place in the organization, typically through messy processes of informal learning that must necessarily be carried out by people at various levels who are deeply involved with the specific issues at hand.*
>
> *The problem is that planning represents a calculating style of management, not a committing style. Managers with a committing style engage people in a journey. They lead in such a way that everyone on the journey helps shape its course. As a result, enthusiasm inevitably builds along the way. Those with a calculating style fix on a destination and calculate what the group must do to get there, with no concern for the members' preferences."*

The Notion of Hoshin

> In an effort to get around some of the difficulties associated with traditional strategic planning, many health care institutions have turned to HOSHIN planning, a Japanese planning model which focuses more on process improvement outcomes than on results oriented outcomes.

It is too soon to predict the success of this model which began to be used in North America in 1988. Also known by the title MBP (Management by Planning), Hoshin Planning was first introduced in the United States by Hewlett-Packard, Florida Power & Light and Procter & Gamble.

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Hoshin Planning is friendly to TQM in several ways - firstly by its focus on Continuous Improvement. It is also systems based, and uses the Shewhart Cycle, PDCA, as a method. It uses a cross-functional approach in order to be responsive and relevant.

What does all this have to do with basic skills providers and trainers who come into the workplace from outside?

Some would say:

> *"Nothing. It has nothing to do with it. Outside educators come in to do specific upgrading, arranged after a needs assessment and assessment of employee needs. These educators do not need to know what is happening in the planning stages carried on at the macro organizational level."*

Others would say:

> *"Everything. It has everything to do with it. Outside educators don't just come in to do specific training. They are not just entering a workplace classroom. They are entering a workplace culture. That culture is affected not only by the WHAT of the plan but by the HOW of the plan. If these trainers are not aware of these modalities, they will miss out on an opportunity to use creative approaches to curriculum which build upon the values and norms of the macro organizational vision, as reflected in the plan."*

There is a major gap between these two statements - a gap which will be the focus of much dialogue in the foreseeable future.

> There are many leaders in the literacy communities, both practitioners and funders, who see the educator role in the workplace as essentially separate from the organizational context. Indeed, in the absence of in depth knowledge of Total Quality, some see TQ as a fad - something of peripheral relevance. Others may see it as more rooted, but are inhibited from immersing themselves in it since there has been a high number of reported TQ failures.

The National Quality Institute recognizes this problem and is endeavouring to re-engineer Total Quality. Duncan MacIntyre, former President and CEO of the National Quality Institute, wonders whether basic skills may be the key which will unlock the mystery of the failure rate.

Establishing the context for why educators providing training in a hospital setting would benefit from an awareness of TQ begins with a scan of what hospitals are doing. One Central Ontario hospital has set up cross-functional work teams to deal with issues such as absenteeism, i/d and hospital security, the pre-admission process and the handling of supplies. There are also several departmental teams examining scheduling and process flow.

Work teams generally are made up of 25 stakeholders, drawn from all levels and all parts of the hospital system. Statistical tools used most often by the work teams include cause and effect (fishbone) diagrams, brainstorming, Pareto charts, histograms and run charts. No tools are taught without specific applications.

It is not hard to see how this context can provide relevance for a literacy and numeracy instructor/facilitator. Yet to a large extent educators are excluded from the process - some by their own volition, others because the hospital administration has not made the link between basic skills instruction and TQ facilitation. ESL courses, for example, are partnered with the local Board of Education, arranged through the hospital's Human Resources Department. The ESL instructors get general information from the internal people as part of their orientation.

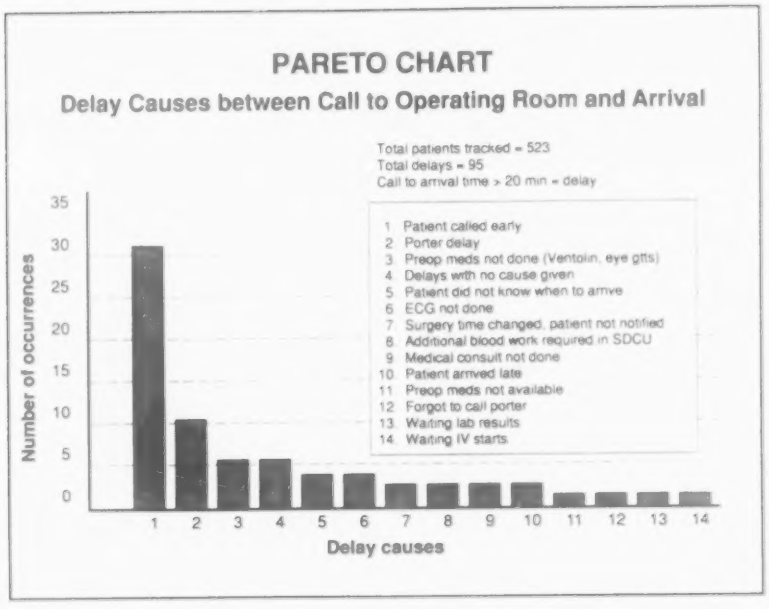
Although it may be more difficult to integrate ESL and TQ than it is to integrate literacy/numeracy and TQ, vocabulary development can take the form of fishbone and brainstorming tools.

> To some extent, literacy and numeracy problems are camouflaged. Often non-attendance on the day a team is to meet is seen as an "attitude" problem rather than as a fear of having one's lack of competence exposed.

The Quality Director I spoke to at the Central Ontario location noted that the facility had not yet identified a literacy problem related to teams. She admitted, however, that it was not an issue they had done much thinking about. She recognized a responsibility on the part of the team facilitator to make sure that information is understood, and that written material is kept within appropriate bounds that reflect the diversity of the team membership.

A visit to a southern Ontario hospital provided further insight. This was a hospital with a sterling reputation for Quality. Their view of Quality, however, did not include a high emphasis on literacy and numeracy development. "We can overdo the importance of literacy.", the CEO said. "We firmly believe in adaptation - that one can participate in a team without being able to read and write." Oral communication skills are emphasized in this hospital. In training sessions and team work, employees are not put into a position where they must read or write. The view is that: "There is always someone on the team who can do it - the person who can does."

This hospital has no in-house upgrading program. Over the past few years only 3 employees have "asked for" upgrading, and they have been referred to a high school or volunteer literacy program in the community. An "All Points Bulletin" asking employees if they wanted a work based literacy program did not (perhaps unsurprisingly) sustain interest. It is impossible to know what kinds of changes may have come about if this hospital had looked at basic skills development as a natural and integrative part of all the other learning which is taking place rather than as a separate focus which was deemed mostly as irrelevant, or at least separate.


PARETO CHART
Delay Causes between Call to Operating Room and Arrival
Total patients tracked = 523
Total delays = 95
Call to arrival time > 20 min = delay
1. Patient called early
2. Porter delay
3. Preop meds not done (Ventolin, eye gtts)
4. Delays with no cause given
5. Patient did not know when to arrive
6. ECG not done
7. Surgery time changed, patient not notified
8. Additional blood work required in SDCU
9. Medical consult not done
10. Patient arrived late
11. Preop meds not available
12. Forgot to call porter
13. Waiting lab results
14. Waiting IV starts
Number of occurrences
0
5
10
15
20
25
30
35
1 2 3 4 5 6 7 8 9 10 11 12 13 14
Delay causes

Source: RX for Hospitals, Newe Hope for Medicare in the Nineties, Philip Hassen, Stoddart, 1993

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CHAPTER 7 - ASSEMBLING THE BEDROCK/QUALITY TOOLBOX

Now that we've gained some insight into the dynamics of bedrock skills and total quality, we're going to build a toolbox which will link these two entities in a concrete and usable way. But first, let's do a bit of a stock taking.

By now the reader will have gleaned some insight into the basic skills/TQ link. What remains is to present some observations of how many Canadian businesses and institutions are actually dealing with basic skills enhancement within the context of their Quality initiatives.

I wish I could say that the TQ/Basic Skills link is well understood and that Quality workplaces are giving serious thought to training and development issues. Some are. I was impressed with the way that John Deere Corp. is trying to build skill building links both through labour and education sources. However, many companies are not so forward looking. I know that because of a study I conducted recently for ABC CANADA, the national foundation for literacy through a grant from the National Literacy Secretariat.

The study was made up of in-depth telephone interviews with businesses, hospitals and educational institutions. In each instance three main categories of respondents were chosen to take part in the interviews - a senior Quality manager, a union representative and a trainer. In total 42 interviews took place, covering 6 companies, 7 hospitals, and 4 educational institutions - both community colleges and Boards of Education.

As a fairly enthusiastic devotee to Quality, I expected to find that, in general, organizations involved in Quality would have an advanced way of thinking in regard to basic skills issues - that is, that they would have a good understanding of the importance of foundation skills and a mechanism to encourage basic skills enhancement as an integral part of other forms of training.

Here is what I, in fact, found. Keep in mind that the following observations are based on consolidating information from many sources, and as such, may be unfair to several individual organizations surveyed that do not share these characteristics.

- Total Quality companies do spend a considerable amount of time and resources on training. Much of this training is related to Total Quality in the areas of team building, promotion of systems thinking, and the use of the Quality tools. For example, one company had an obligatory four day training session for all new employees, focusing on simulated team building exercises. A hospital regularly posts charts and graphs for the benefit of all employees and has provided training to everyone on how to interpret them.

- Despite a dedication to Total Quality or CQI, few companies or institutions surveyed have developed strategies for dealing with basic skills needs. In general, training is in-house, thus cutting off the stimulation which could be brought in by outside educators. In addition, facilitators who deal most intimately with training needs have for the most part not been exposed to basic skills sensitivity issues - that is, they may not perceive how basic skills training can be an adjunct to Total Quality training.

- Total Quality workplaces may unintentionally marginalize workers with low levels of basic skills proficiency. This happens, for instance, when workers with undeveloped reading,

writing and math skills are overlooked by managers and facilitators in the setting up of work teams. As one interviewee put it, "We tend to include people on the teams who are as much like us as ourselves - people whose skills we respect."

Workers with low level basic skills will rarely volunteer to serve on a team. They thus tend to become a forgotten underclass at the bottom of the organization. Many companies would be surprised and shocked to think that this is the case. They may want to ask themselves the consequences of a selection process that either wittingly or unwittingly peripheralizes a large number of the people whom they rely on to produce their products or services.

Fuller details of the Total Quality/Basic Skills Project are available from ABC CANADA in Don Mills, Ontario.

It is interesting to speculate whether this same phenomenon discovered in the ABC CANADA study is present in ISO 9000 implementation. If workers are not involved in the conceptualization, flow charting and writing up of their own work processes, the resulting ISO documentation and manual may end up to be a sham. At the very least, it will not maximize those employees' understanding of their contribution to Quality processes. When consultants not involved in the processes completely take over the documentation functions, one must ask whether this is a further disempowerment of workers.

Our stock taking of the present situation is somewhat bleak. What can salvage the situation, however, is a focused attention on the toolbox which will link quality and bedrock skills inextricably.

What's in the toolbox?

Skills are in the toolbox - more specifically, ten particular skills required in the Total Quality Workplace, along with the package of tools needed to maximize these skills. Getting back to our "bedrock" and "quicksand" analogy, these tools are like the trowel and rake used to create a good solid finish around the learning pyramid. Without these tools (which are also skills) available to provide strength to Total Quality implementation, all will founder in quicksand - or, stated less dramatically, without the bedrock skills, Total Quality will not be on solid ground .

Here they are:

Participating on Cross-functional Teams	**Reading & Interpreting Control Charts, Graphs, Flowcharts**
- ability to read information from flipcharts & handouts - ability to express ideas coherently - ability to analyse components of a job and see relationships within the system - understanding of PDSA cycle for process improvement, with the reading, writing, calculation aspects this may involve in order to test a change on a small scale - understanding of variation and how to collect/read data	- understanding of basic statistical concepts - numeracy skills to calculate variances - understanding symbols in flowcharts - switching from visualization of a process *(I see what the machine is producing)* to abstraction of the process *(I see what is happening when the machine's production is charted on paper or on a computer screen)* - analytical skills to understand implications of charts for continuous improvement (problem solving).
Oral Communication - ability to communicate with customers - ability to negotiate - ability to provide clear explanations - ability to see and explain relationships	**Contributing to Brainstorming Exercises** - ability to read from flipcharts - ability to conceptualize and organize information - ability to see interrelationships - appreciation of others' points of view - ability to speak up confidently
Understanding Cause and Effect (fishbone) - ability to analyse - ability to see and probe interrelationships - ability to move from the familiar to the unfamiliar - risk taking	**Understanding how to Categorize and Record Ideas (Affinity diagram)** - writing skills - point form - spelling of familiar terms - ability to distinguish important from less important points

Critical Pathing - visualization of a process - understanding of time parameters and time lines - understanding of the planning process - calculation of time frames and resource allocations	**Formulating Suggestions** - analytical skills - ability to write clearly - computer skills - ability to convince others - ability to assemble and present relevant data to support suggestions
Analysing Needs of Internal & External Customers - understanding what one contributes to customers both upstream and downstream - ability to provide data or reports to support customer needs - ability to adapt processes to better serve customers (could involve revision of reports, recalibration of equipment or changing methods or format of data collection)	**Writing Minutes of Meetings, Short Status Reports** - ability to write in points, sentences, paragraphs - ability to distinguish important from less important information - ability to accurately explain points of view - ability to write concisely - ability to categorize and organize information - ability to write according to format - accuracy in spelling and in sentence structure

CHAMPIONING THE LEARNING LINK - A MULTI-PRONGED PROCESS TO ENSURE THE SUCCESS OF YOUR QUALITY TRANSFORMATION

IF YOU ARE THE CEO:

Exercise Quality Leadership

> Make sure that each employee, from the VP at his rosewood desk to the delivery person on his bicycle, is involved in the Quality journey and that everyone knows what it means to be part of a Quality workplace.

Don't assume that all workers will understand what it means to be "empowered". Some may assume that management is abdicating responsibility to work units, or that it's a feint masking a play.

The following analogy may help. "Empowering employees does not mean that the captain throws the charts overboard and turns the ship over to the sailors. It does mean, however, giving the sailors the tools, the authority and, above all, the knowledge base to have meaningful control over their own jobs. It also means that before sailing the crew had a voice in charting the passage."

Involving all personnel in examining the mission and the vision of the organization will provide that voice. It doesn't mean that employees collectively determine the mission through a "50 percent plus 1" vote. It does mean that they have had meaningful input - hopefully, input that is listened to and valued, input that is a learning experience both for themselves and for the company.

Send a signal that you want the tenets of Total Quality to reach to all levels of the organization.

It is easy to pay lip service to the concept of equality and to pronounce that everyone is an equal beneficiary of Total Quality. The reality, however, may be quite different. It takes more than information sessions, meetings, and exhortations to build an organization which is as deep as it is high. It will require considerable analysis of your work force's skills to make sure that all the tools, methods and strategies of Total Quality are understood by everyone. You will want to examine the composition of teams, for example, to discover whether they are as participatory in fact as they are in design. If they are not, then look at barriers to participation. Don't be surprised if one of them relates to bedrock skills!

Make sure that training is both holistic and integrated - and that it is accessible to all.

Don't make the mistake of thinking that training **in** Total Quality is the same as training **for** Total Quality. Many organizations spend a great deal of time and money training staff on statistics, cross-functionality, and team building, and then forget that these are the means to an end - not the end itself.

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> It would be sad if training in TQ were to achieve such a high profile that other forms of training were forgotten. Trades training, technical training, and upgrading programs are just as necessary as before or even more so. Many workers will have a heightened need to improve their bedrock skills in order to understand the many nuances of TQ training.

The policies set at the corporate level will determine whether training is holistic and integrated or partial and fragmented. Approaches to tuition reimbursement, assistance available from educators, and paid time allotted to training will tell the tale. How easy is it for employees to learn in your organization?

Find ways to build employee self esteem.

Dr. Deming introduced in his work the concept of "intrinsic" and "extrinsic" rewards. Extrinsic rewards such as money are not motivators. Rewards, he says, encourage people to seek more rewards. He suggests a number of intrinsic rewards, varying from recognition, to time off, to enrolment in a wanted course. Be clear on the difference between remuneration and recognition. A letter from the supervisor saying "Well done!" after a particularly challenging work period may mean more than some tickets to a ball game - but only, of course, if the thoughts expressed in the letter are sincere.

IF YOU ARE THE UNION REP OR FRONT LINE WORKER SPOKESPERSON:

Make sure that you are a partner in TQ implementation - a real partner, with a voice on the Quality council.

You have probably heard a great deal about the downside of Quality and you don't want to see that happen in your workplace. However, make sure that you understand fully the philosophy before you condemn it.

Take for example the Quality workplace's emphasis on Statistical Process Control and understanding of variation. Total Quality principles call for measurement at crucial steps in a process in order to understand whether variation by "special cause" needs to be addressed. These special causes could be anything from a leaky valve to a poorly cut supply of screws. Without measuring variation over a period of time, it is easy for a company to miss out on identifying faults which could erode the quality or effectiveness of a product. The TQ emphasis is on measuring the variation within processes rather than on measuring outputs when it is already too late to influence change.

As an employee spokesperson you will want to ensure that measurement, as in the above example, is indeed carried out to plot process improvement rather than to identify employee error. If you have any doubts on the way the process is handled, make sure that it becomes a subject for discussion at the Quality Council.

> The best way to ensure your point of view is well understood at the Quality Council is to immerse yourself in the philosophy of TQ so that you can point out faulty and insensitive implementation when it occurs.

Be vigilant. If Total Quality is grafted onto an existing structure of management rather than supplementing the old style, there are bound to be conflicting philosophies vying for space in the same workplace. You will be well placed to point out problems and to seek solutions that respect workers. This is exercising leadership on behalf of those you represent.

Be the enabler who ensures that the tenets of Total Quality reach to all levels of the organization.

Ok - so you may not be thrilled with Total Quality anyway - so why should you want it to reach all through the organization? Because if it has this kind of outreach, so will other forms of workplace equality. You are in a position where you can clearly see who is inside and who is outside of the process. So the CEO has sent a signal that she/he wants Total Quality concepts to reach all levels of the organization. That signal may be strengthened or weakened depending on how you receive it. You can influence the extent to which workers at all levels feel comfortable with participating on teams, and you can help them to construct a personal skills building plan to overcome anxieties about their participation. Without your support there will be limited buy-in from those who look to you for direction.

Influence the training plan and its outreach.

Unions have a direct stake in the success of training. In some sectors, such as construction and the grocery sector, the unions run the training centres, hiring the instructors, preparing the course design and delivering the training. They may differentiate between the technical and trade training area which they feel is their key role and the more management related knowledge areas which are of less interest to them. Management often arranges for these latter types of courses themselves.

No matter how the actual division of training course content is divided between management and labour, labour has a responsibility to ensure that all training offered respects the rights and needs of its members.

The nature of supervisory training is a case in point. Levels of supervision close to the worker are no longer needed as much as they once were. In the Total Quality workplace the concepts of supervision and control yield to the concept of leadership and mentoring, and to team participation and joint decision making. There will be more of a focus on peer interaction rather than on superior/subordinate relationships. The union which puts its individual stamp and direction on this type of training will be in a strong position to influence both the content of training and the way in which it is delivered. In effect, you will be putting your imprint on how the learning function will be built within your workplace. "Management" skills have been re-conceptualized and are no longer isolated from other skills areas.

Build employee motivation.

It is not just management's responsibility to build self esteem through offering intrinsic rewards. The union can also be a motivator. Sometimes it is easier to be a cynic than a motivator.

If, however, a climate of respect and trust is built between labour and management, both sides can be soloists for the same orchestra. After awhile they may even become a duet in regard to certain issues.

If learning is made the key to building employee motivation it will be a positive experience for everyone. Making sure that employees are motivated towards learning will be a key fact in creating the atmosphere of trust.

IF YOU ARE A LEARNING PROFESSIONAL:

Be the link between management and workers.

As a person with a highly specialized role, you may assume that you are not well placed to exercise leadership in regard to Quality implementation. But you are in fact the vital link between Quality theory and Quality practice. It is you, more than anyone else, who assists workers at all levels to understand and use the Quality tools. Your leadership is on a day-to-day and highly practical level.

> When you help a worker understand flow charts, contribute to joint problem solving, and write up effective summaries of meetings you are on the leading edge of change.

Communicate learning needs to all key decision makers within the organization who have control over resource allocation.

Don't wait for management to ask you about learning and training needs! It may not happen. Be proactive. Let management know that you have identified some learning needs which will assist both individuals and the organization. Remember that you should deal sensitively with upgrading needs which have come to your attention. Focus on a unit rather than an individual - for example: "It seems that the Production unit would benefit by a mini-course on flow charting.", rather than "Mary and John in the Production Unit were not very good at flowcharting."

Take pride in the fact that you are assisting workers to build a solid foundation of bedrock skills. Help workers scale the corporate learning pyramid. Remember that, with your help, they will be able to stand on a firm foundation, avoiding the quality quicksands.

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ENDNOTES

page xvi - As Senge explains it, "dia-logos" meant a free flowing of meaning through a group, allowing the group to discover insights not attainable individually. Discussion has its roots with percussion and concussion, literally a heaving of ideas back & forth in a winner-takes-all competition.

page 4 - Hays, David W., Quality Improvement and its Origin in Scientific Management, Quality Progress, May, 1994.

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APPENDIX I

AN EDUCATION PROFILE - ST. LAWRENCE COLLEGE

With thanks to Diane Lalonde, Total Quality Coordinator, St. Lawrence College, Cornwall Campus, for sharing the Total Quality Participants' Manual used by the College and for permission to quote passages from it. In the descriptions which follow, the sections entitled "Major Aspects" are extracted directly from the Manual.

AN EDUCATION PROFILE - ST. LAWRENCE COLLEGE

St. Lawrence College is located in Kingston, Ontario. Known as the "Limestone City" because of its many old stone buildings of heritage vintage, Kingston was once the capital of Upper Canada, and the home of Canada's first Prime Minister, Sir John A. MacDonald. Situated on Lake Ontario, with both the Rideau Canal and the St. Lawrence River at its gates, it is Eastern Ontario's second largest city, lagging only behind Ottawa in population.

Since St. Lawrence College serves a large section of Eastern Ontario, it has two additional campuses, located in Brockville and Cornwall. All three cities share the St. Lawrence River. Brockville, 80 kilometres from Kingston has become an industrial community, and is now home to many Quality organizations. Cornwall, 95 kilometres to the east of Brockville is a community of diversity, with West Quebec on its one boundary, and the International bridge to New York State and to the Akwesasne Indian Reserve on the other. Cornwall was settled by Scottish and French settlers and is one of Eastern Ontario's most bilingual cities. Its economy has been shaped to a large extent by the commerce of the St. Lawrence Seaway.

St. Lawrence College is an Ontario College of Applied Arts and Technology, delivering an array of post-secondary career-based programs as well as general interest courses. There are approximately 4,800 full-time students and some 20,000 part-time students. There are six schools in the Academic Division.

This study of St. Lawrence College began with meeting Ron MacPhee, Chair of the TQ Steering Committee, President of the Academic Union (the union), and Trainer in SPC and TQM at St. Lawrence College. Ron was doing a presentation to the ASQC Toronto Section Quality Forum, in March, 1994. I attended the Forum to get a broader idea of the outreach of Quality. I had attended mostly "business" oriented sessions and was fascinated to see an educational institution on the agenda. What struck me most at the session was that here was a union spokesperson (President OPSEU Local 417) talking in a very positive way about Total Quality. As a matter of fact, a large part of his presentation was a critique of the Ontario Federation of Labour position on Total Quality. I had just recently completed my own critique and was therefore interested to see if they aligned. (They did.)

St. Lawrence College's Quality journey began in June, 1992 with commitment at the top - when a College President who had been a senior executive in the chemical industry took office. It also started with a role model - Rio Salado College in Phoenix, Arizona. Staff from Rio Salado were invited to train forty college staff from all employee groups. Training sessions were five days in length. Between May, 1993 and October, 1993, 400 out of 615 full time employees had completed the five day course.

Two weeks after completing the TQM course, cross functional teams were in action on all three campuses. Quality Improvement teams were launched to address key processes as identified by senior managers and approved by the steering committee. Teams use TQ techniques in their meetings. As McPhee puts it, "Flow charts pop up everywhere; affinity diagrams appear on walls; cause-and-effect diagrams appear on blackboards; meetings are rated with Plus/Delta techniques; faculty start to use TQ techniques in their classes."

A Total Quality Steering Committee has been established to provide leadership and direction to TQ implementation. The College President serves as an ex-officio member. There are also two Vice Presidents, three academic managers, three non-academic managers, from areas such as Marketing and Plant, three faculty, three support staff, and the Total Quality Coordinator. The Coordinator, Diane Lalonde, who works from the Cornwall campus, is a member of the business faculty and a union steward. She confirmed what I had already learned from Ron McPhee - that there have been no substantive conflicts with the union. The Coordinator sees her position as one of facilitation rather than management, and has remained on faculty under the premise that TQ can be handled from that part of the organization.

The move toward multi-skilling, part of the Total Quality environment, has highlighted a potential problem area for people with low basic skills. More often, however, the College sees a problem arising not so much from basic skills deficits as from not understanding the expectations of an expanded job. The term empowerment is explained in a very specific way. "What decisions are made at another level that you could make at your level?" Placing the concept of empowerment within that context assists workers to see beyond a buzz word and to identify ways to make empowerment happen.

St. Lawrence College has prepared a Total Quality Participant's Manual which serves as a blueprint for all staff. Section 6 deals with Tools. It is the use of the tools that has in large measure shaped the success of much of the College's implementation. Here are the tools - from a to v.

The Tools from a to v.

(a) Affinity Diagram
(b) Brainstorming
(c) Nominal Group technique
(d) N3
(e) Three Dot
(f) Straw Vote
(g) PMI
(h) de Bono's Thinking Hats
(i) Check sheet
(j) Flow Chart
(k) Deployment Flow Chart
(l) Focus Groups
(m) Force Field Analysis
(n) Nine Block
(o) Rating Scales
(p) Questionnaire
(q) Cause and Effect Diagram (Fishbone)
(r) Histogram
(s) Pareto Chart
(t) Run Charts
(u) Control Charts
(v) Scatter Plots

A brief description of each is provided here, with thanks to St. Lawrence College. A fuller description is found in the College's Manual. After each descriptor, I have identified areas of relevance for basic skills trainers or others involved in the upgrading of workers' or students' skills. When no basic skills instructor is at hand, that person may be the facilitator whose job it is to animate and empower cross-functional teams.

It is interesting to note the scope of these tools. Some are statistical in nature and well known for their link with Continuous Process Improvement, while others come from the creative thinking domain of Edward de Bono. From my interviews with various staff members I have gained an impression that the problem solving tools are more in use at the present time than the statistical tools, although refining the information gathering tools is definitely on the agenda.

I interviewed three team members dealing with the Teaching Assistant component of the Social Services program in Health and Applied Arts. They indicated that they use many of the tools in their own meetings. This team finds the affinity diagram particularly useful for generating ideas. In their meetings, the Problem Solving Tools are more useful than the Data Collection tools. Students are taught both types of tools. The professors use both types when looking at issues such as family violence, where data collection can be useful as a behaviour measurement. Particularly useful for this issue are: Affinity diagrams, force field analysis, PMI, and possibly Pareto and histograms.

Besides being introduced to the tools, students buy into the TQ philosophy through a TQ rules card which they keep on their desk. Since they devise the list themselves, there is an immediate "buy in".

Staff have learned to use the Total Quality Participant's Manual effectively. There is some leeway in the way it is used. This will be important to facilitators who are aware of diverse competencies within a group. A Brockville campus staff member explained.

> *"When teams start to use the tools, a facilitator is assigned to the team. If we have a meeting and you're good at affinity diagrams, you would volunteer and help the team work through the tool. Each of us have different tools we understand and enjoy. Some would be good at flow charts. Each process needs flow charts. We have developed different ways of doing them - some using words instead of symbols. There is also a deployment flow chart which shows who has the responsibility. If you get to a difficult part of the team's project where you want to calculate standard deviation, you bring in the facilitator to help on that."*

Facilitators are in a key position to notice if workers have basic skills training needs, although they have no responsibility for basic skills training of those who can't grasp the concepts after they have been explained several times. Every TQ workplace has team facilitators. These people are a recommended access point for basic skills trainers. Trainers should talk to them to find out what kind of needs have emerged during team work.

Six teams set up at St. Lawrence College are:

Communications
Rewards and Recognition
Design of a Staffing Model Process
Total Quality in the Classroom
Design of an Academic Program Review
Academic Delivery.

The Brockville Campus Status Report on TQM in the Classroom shows how the various tools were used by this team. The Affinity Diagram was used to describe the process before the change -e.g., classrooms with walls, and a traditional lecture way of teaching. From the list of "symptoms" identified in the Affinity Diagram, Multivoting was used to prioritize the concerns. A Cause and Effect Diagram, followed by a N3 Process then completed this analysis. The N3 led the team to the conclusion that teachers in the classroom were misusing the learning environment. Professional development was then highlighted as the solution. Questionnaires and focus groups were used to determine professional development needs.

Tools of the Scientific Approach
Adapted from St. Lawrence College's Total Quality Participants' Manual

Tools to Expand your Thinking

- Affinity Diagram
- Brainstorming - pencil and paper, round robin
- Nominal Group Technique
- N/3, Three Dot
- PMI
- PO

Tools for Gathering Information

- Check sheet
- Deployment Flow Chart
- Flow Chart
- Focus Group
- Questionnaire

Tools for Organizing Information

- Affinity Diagram
- Control Chart
- Fishbone (Cause and Effect, or Ishikawa Diagram)
- Force Field Analysis
- Histogram
- Nine Block/Rating
- Pareto Chart
- Scatter Diagram
- Run Chart.

Note: The Affinity Diagram appears on two lists.

Affinity Diagram:
A technique to help generate and organize ideas

Major Aspects

1. *Establish a team and a facilitator*
2. *Define the problem in the form of a question. Write it visibly.*
3. *Brainstorm, writing each idea on a Post-it note. Post on large flat surface.*
4. *Announce the idea verbally as you post it. Ask team to silently group with similar ones. Team members can move idea from one grouping to another.*
5. *Discuss. Do minor re-arranging. Name each grouping with header card.*
6. *Draw the affinity diagram by displaying the notes on a flip chart.*
7. *Discuss groupings and ask team members to identify key issues for further analysis.*

Bedrock Skills Elements:

Pro	Con	Tips
- There is a high level of oral interaction in preparing an affinity diagram. An employee or student with low-level reading and writing could still understand what is going on by active listening. - Brief responses (6 or 7 words) to a card are relatively easy even for weak writers.	Workers with weak literacy skills could get confused toward the end of the exercise because of the volume of cards.	Use the discussion in the Affinity Diagram exercise as a context for preparing vocabulary lists of key words. Note spelling difficulties which could be remedied by applying rules. Use the content area to develop some related exercises which link oral problem solving with written expression. Show trainees how to reformulate thoughts and present them in simpler ways.

Brainstorming

A tool designed to remove barriers to generating maximum input on a subject

Major Aspects

1. *Clearly state the question and have it visible to all participants*
2. *Participants call out ideas as they come to mind*
3. *Facilitator/recorder writes ideas on flip chart as they are presented. There is no discussion of the ideas as they are suggested. The recorder writes the ideas as stated. People can build upon ideas presented by others.*

Bedrock Skills Elements

Pro	Con	Tips
The ideas are stated orally and the writing is done by the recorder. This will take pressure off participants unsure of their writing ability.	As with the Affinity Diagram, there may be a problem for weak readers at the conclusion of the exercise when everything on the flipchart is being viewed holistically.	It will be useful to do some brainstorming with a small group before they are exposed to the process in a larger cross-functional team. Make sure to use content areas with which the group feels comfortable so that they will feel a comfort level with the process. If they have had practice with you they will feel more secure when they go into a cross functional team and are expected to participate in a more highly charged situation.

Nominal Group Technique

A group technique for generating and prioritizing ideas

Major Aspects

1. *Present the question. Write the statement visibly for all participants.*
2. *Participants write a list of three-to-five word answers to the question silently.*
3. *Develop a master list. The facilitator asks each member to read an idea from her/his list. As each is given, the facilitator records it on a chart.*
4. *Initially rank the items. Each member selects and ranks the five most important items, with a value of 5 for the most important and 1 for the least important. Facilitator tallies the results.*
5. *Discuss initial ranking. Participants can elaborate but not add items.*
6. *Develop final list and rank items. Each participant ranks the top five. Facilitator ranks final values.*

Bedrock Skills Elements

Pro	Con	Tips
The amount of writing required is brief.	This exercise calls for organizing information, prioritizing and sequencing. These may be unfamiliar functions to some employees.	- Get employees to list tasks they perform on the job and place them in order of importance to them. To get them to understand others' points of view, ask them to think whether a supervisor would list them in the same order and why or why not. - Probe problem solving techniques. *How did you determine which item was more important than another*? Do all trainees use the same problem solving techniques? How do they differ? Do learning styles influence how trainees approach problem solving? - Help trainees learn how to fill out a Worksheet for the Nominal Group Technique.

N/3 (N over 3)
A technique for generating and prioritizing ideas
Major Aspects

1. *List items/alternatives on a flip chart.*
2. *Count the number of items and divide by three. The resulting answer is the number of votes accorded to each participant.*
3. *Each participant votes for the alternatives they favour. (Show of hands or check marks on a list)*
4. *Tally results and record the most popular selections in descending order.*

Bedrock Skills Elements

Pro	Con	Tips
No writing is required except by the facilitator. This will create a comfort level.	Participants with weak reading skills may become confused by a long list and not signify their choices accurately.	The learning professional could model to the corporate facilitator an approach that will be comfortable for employees with significant bedrock skills upgrading needs, while not being inappropriate for other members of a group, i.e. - reading the list aloud slowly so that those with reading difficulties can conceptualize the various items more clearly. The list on the flipchart can then become content for a skills upgrading class afterwards to assist trainees to become familiar with the concepts and vocabulary presented.

Three Dot

A group technique for generating and prioritizing ideas

Major Aspects

Each person gets three votes and three sticky dots. The most popular items will have the most dots beside them.

Bedrock Skills Elements

Pro	Con	Tips
This method will appeal to employees who like a visual approach to their problem solving. It also gets people up and moving to the flipchart, providing opportunity for some interaction.	While appealing to certain employees, this approach may seem childish to employees who are used to a less dramatic approach to recording choices.	Recommend to group facilitators that this may be simpler to some employees than several of the other methods. While the Nominal Group Technique is popular, the Three Dot approach is clearly easier to carry out and calls for less advanced skills.

Straw Vote

A group technique for generating and prioritizing ideas

Major Aspects

1. *List items/alternatives on a flip chart.*
2. *Participants raise hands to indicate every item they wish to keep on chart.*
3. *Eliminate items with fewer than three votes.*
4. *Tally results and record most popular selections in descending order.*

Bedrock Skills Elements

Pro	Con	Tips
The straw vote is non-threatening since it requires a show of hands rather then speaking, reading or writing	Because voting is highly visible, some employees may vote the way they feel is expected rather than the way they actually feel.	As with some of the other techniques, it will be helpful if the facilitator reads each item clearly aloud rather than just saying: "What about item 3?"

PMI (Plus, Minus, Interesting)

A technique that forces team members to recognize and appreciate more than one side of a question

Major Aspects:

1. *Divide participants into groups of four to six. Have group members assign a recorder.*
2. *Give participants an idea to consider.*
3. *Have groups spend one or two minutes seeking only the positive aspects.*
4. *Give similar amount of time to consider the negative aspects.*
5. *Allow a similar amount of time to seek what is interesting about the question - what it might lead to, what it reminds them of, etc. A page with three columns labelled "+ Plus", "- Minus", "Interesting" will be a format to record ideas according to the three categories.*

Bedrock Skills Elements

Pro	Con	Tips
This is non-threatening for low literate employees since much can be done orally.	If participants are asked to prepare a written list this may present a problem for those who feel unable to perform the duty of recorder.	This technique presents many opportunities for the instructor to assist trainees in problem solving. The instructor can help them to identify categories under which they will examine information. The following example indicates how to get the creative juices flowing. *

* The "Coffee Cup" exercise is revealing as a means of soliciting a wide range of points of view. Ask trainees to divide into small groups and discuss the relative merits of the new coffee cup design. From an initial reaction of "It's totally useless.", trainees tend to move on to finding some positive things to say about it. One example: "This style of cup would be good for gardeners since they could poke the stem securely in the earth and not worry about its capsizing." Other trainees bring up points which are neither plus nor minus but simply "interesting" - for example, "It looks like something a wizard would carry around."

When the small groups compare their findings, they discover that an initial negative or quizzical reaction has turned into a full-scale analysis. The instructor can point out that this same technique can be applied to many less dramatic ideas.

Title Model 412 Coffee Cup	*Project Kitchen equipment redesign*	
Designer Roger von Oech	*Scale 4:5*	*Drawing no. 1A*

* Reference: Oech, Roger, von. (1986). *A Kick in the Seat of the Pants.* New York: Harper and Row.

The Six Thinking Hats of Edward deBono

This exercise is a mechanism to organize the thinking process. Often thinking can be disjointed and one-sided if no means exists to consider an issue from many viewpoints. When team members are asked to wear the various "hats' they are able to formulate ideas which may not have come to them without this intervention.

Major Aspects:

The six hats are:

White hat: *Neutral and objective, the white hat gathers data and information that can be of use in the thinking process, and checks the reliability and certainty of the data.*

Red hat: *The red hat actively solicits emotions, feelings, hunches and intuition.*

Black hat: *The black hat asks you to think about what could go wrong, and what you don't like about an idea. (This allows you to separate the "emotional-negative" from the "logical-negative".*

Yellow hat: *The yellow hat asks you to smile at the idea and look for its possible benefits and strengths.*

Green hat: *The green hat asks for creative, non-judgmental responses to the idea under consideration.*

Blue hat: *The blue hat is concerned with the thinking that is taking place, not the idea under consideration - i.e. - the blue hat organizes the thinking.*

Bedrock Skills Elements

Pro	Con	Tips
For many people, the thinking hats makes concrete a process which is abstract. Many people with basic skills upgrading needs are visual thinkers. Anything that can assist them to break their thinking into analytical components will be helpful. The Thinking Hats technique has proved useful with cleaning and maintenance workers - hands-on persons who have not done a lot of thinking about analytical problem solving.	People who already have sophisticated problem solving techniques may find the thinking hats an impediment rather than an aid to their thinking process. It may be that there will be some tension within the group if all do not readily accept the usefulness of the technique	- Use the 6 hats as a fun way to talk about the thinking process. This approach is more palatable to non-academically inclined team members who may find discussions of thinking too theoretical. It can also lighten up a serious subject. - Make sure that the various concepts behind the 6 hats are well understood. Show trainees how to integrate the insight they gain from each of the 6 hats. Since how to assemble and integrate information is a key literacy skill, the discussion arising from the process will be helpful. Make sure that the discussion centres as much on the process of thinking as on the issues which emerge from the exercise.

PO - A Tool for Creativity

"Po" is a word coined by Edward de Bono to foster a creative atmosphere. It is derived from words like **po**ssible, hy**po**thesis, sup**po**se, **po**etry, and **po**sitive. In this case, ideas are used to provoke debate and move from one pattern of thinking to another.

Major Aspects

1. *Introduce a random word.*
2. *Try to make connections between the random word and the topic you have been considering.*
3. *Reverse the general way you look at a topic and see if it provides new insight - e.g., How could we increase student attrition?*

Bedrock Skills Elements

Pro	Con	Tips
This activity may be a way to "loosen up" the team and free up some spontaneous views.	This associative way of thinking may be confusing to someone who places more emphasis on facts than on possibilities.	Keep this brief, and be ready to move on if it stalls. Make sure team members or trainees understand what is being done - i.e. - the non-judgemental assembling of spontaneous information which may not have come about in the normal course of events. This exercise will help team members understand the complexities of problem solving. Use this as a spring board to more analytical approaches.

Check sheet

A form allowing systematic collection of data from the source at the time of occurrence (used to count and measure)

Major Aspects

1. *Agree on what data to collect, and what time period.*
2. *Construct Check sheet with boxes for collecting check marks.*
3. *Enter checks as things happen.*
4. *Add up the rows and columns at end of data collection.*
5. *Interpret the data using other tools as needed. (See Histogram)*

Bedrock Skills Elements

Pro	Con	Tips
This is a simple tool.	If there is a high volume of events to be checked off, this could be difficult. In addition, the design of the collection chart is critical to the final result. Are all the appropriate headings listed?	This is a good introduction to a simple graph form with two axes. Don't assume that all employees are familiar with using charts. As a preparation for a work related chart, you could have trainees conceptualize and track an activity of their choice - e.g. - when I ate food from various food groups, when I scheduled activities for my children, etc. Get trainees to look at their own charts and reflect on the types of information and insight it supplies.

FlowChart

A visual representation of the sequence of steps in a process

Major Aspects:

1. *Identify the system under study and identify the starting and ending points of a process.*
2. *On a flip chart, write the steps involved in the existing process in the order in which they occur. Ask those doing the work what actually happens.*
3. *Assign symbols to each of the steps.*
4. *Draw the flow chart connecting the symbols with arrows indicating flow. Put a small (6 words or less) summary beside each step of the activity.*
5. *Analyse and discuss.*

Basic Skills Elements

Pro	Con	Tips
A flow chart provides a way of seeing a process holistically and sequentially	Persons with weak spatial skills sometimes have difficulty when viewing symbols.	Make sure that all symbols are well understood and consistent. Post symbols in a prominent position so that employees can refer to them. More than one flow chart has looked like nonsense to some readers because the symbols were not clearly understood. Symbols may be used to represent many major functions such as: task, multiple task, decision, meeting, assistance, end, report. Be flexible. Some people learn best by putting down more rather then less. Some employees may want to write out a longer form of the flow chart to help them understand it better. They need to know that conciseness is necessary in a final version of a flow chart and that learning how to separate the most important information from the less important is essential in a flow chart.

Deployment Flow Chart

A flow chart showing the steps performed by different people or groups

Major Aspects

1. *Based on the initial flow chart, list the people or departments involved in the process across the top of the flip chart.*
2. *Move each symbol to the column representing the individual/unit responsible for taking the step.*
3. *Where a task is performed jointly, place a small oval under the person assisting while maintaining the original symbol for the person initiating the step.*

Basic Skills Elements

Pro	Con	Tips
This is a concrete way to understand the cross-functionality of jobs and where each employee's work fits into the system.	To persons who have difficulties seeing spatial relationships, this form of chart might be confusing.	Spend some time interpreting some completed charts. Prepare a new chart step by step discussing each part before going on to the next. Write up the meaning of the chart in short sentences.

Focus Group

Group interviews of between 3 and 6 people designed to gather broad opinions or determine areas of interest or concern

Major Aspects

1. *Obtain skilled facilitator*
2. *Determine the kind of information required and prepare the questions.*
3. *Invite participants representative of the target population.*
4. *Conduct focus group.*
5. *Provide group with feedback.*

Bedrock Skills Elements

Pro	Con	Tips
Since a focus group does not require participants to read or write it does not impose difficulties on persons with low reading/writing skills.	Unless the facilitator is someone the participants feel comfortable with, they may not speak up. People with low mastery of basic skills sometimes have low self esteem as well. It will be important for the facilitator to know how to draw out reluctant attendees.	Make sure the questions focus on issues with which workers are familiar. Be concrete rather than abstract in your introduction to the focus group.

Force Field Analysis

A technique that encourages team members to identify forces affecting change.

Major Aspects

1. *State the desired change. (e.g. - to reduce defects)*
2. *Diagnose - Brainstorm all possible forces - first helping, then restraining forces.*
3. *Rank the forces according to their power to affect the current situation.*
4. *Agree on 3 to 6 helping forces and an equal number of restraining forces.*
5. *Rank them according to how easily they can be resolved.*
6. *Formulate strategies - Brainstorm in order to decrease the strength or number of restraining forces.*

Bedrock Skills Elements

Pro	Con	Tips
The technique is participative and is geared toward discussion.	Some participants may have difficulties organizing (ranking) written material.	This exercise provides the opportunity to subtly introduce some techniques on analysing and organizing information - e.g., underlining key words, comparing and contrasting, stating ideas concisely, filtering important from less important information. These skills can be carried over into other contexts.

Nine Block

A tool to help select among several alternatives based on two equally important decision making criteria

Major Aspects

1. *List possible alternatives*
2. *Identify TWO decision making criteria and place one on each axis of the grid.*
3. *Rate each alternative according to the two criteria and position in appropriate area.*
4. *Eliminate all alternatives whose rating placed them on the bottom row or right hand column of the grid.*
5. *Items that appear in the top left-hand corner rank high enough on both criteria to be satisfactory alternatives.*

Bedrock Skills Elements

Pro	Con	Tips
Small amount of reading/writing. An asset for people who like to have a visual presentation of information.	Some people may resist the structure of this approach.	This exercise presents an excellent opportunity to present a graphic approach to alternatives. Some people may have seen graphs presenting numerical information but may not be aware that plotting on two axes may be done with words as well as with numbers. It will present an opportunity to discuss other uses for graphs.

Questionnaire

A data collection tool designed to gather information from a target population with minimal personal bias

Major Aspects:

1. *Determine information needs.*
2. *Identify target population.*
3. *Determine means of collecting the data.*
4. *Design an appropriate data collection form.*
5. *Administer the survey.*
6. *Analyse the data.*

Bedrock Skills Elements

Pro	Con	Tips
There are substantial pluses to using a questionnaire for highly literate populations. It is easy to administer and elicits a wide range of information. When anonymity is assured it is non-threatening. There are no advantages, however, for using a questionnaire with people with substantial bedrock skills upgrading needs.	The questionnaire presents significant difficulties for people with low literacy levels, especially if some responses are narrative.	If you are aware of low education or low literacy levels among the target population for the questionnaire, consider whether this is the best way to obtain the information. You may prefer to do a focus group. If you do decide to go ahead with a questionnaire, do a readability assessment of the questions to ensure suitability. Using Clear Language principles will be helpful.

Cause and effect diagrams (Fishbone)

A technique to brainstorm causes and effects and determine root causes

Major Aspects:

1. *The team chooses a recorder to work at the blackboard.*
2. *Draw a large fishbone diagram with the perceived problem at the head of the fish.*
3. *Label the boxes with aspects. -e.g. - materials...methods... machines...people...environment...measurement...design...maintenance.*
4. *Brainstorm the causes. Ask "Why?" Record. Keep asking "Why" until you get to the root cause - something which if changed would substantially improve the process.*
5. *See if there is a pattern to the causes. Seek consensus on the root causes.*

Bedrock Skills Elements

Pro	Con	Tips
This technique is non-threatening, since the writing is done by one recorder. This technique solicits a wide range of input from employees/students actually involved in the processes being discussed. It thus has relevance. The fishbone often displays its usefulness in indicating areas where the team's knowledge is sparse. It therefore indicates areas where data collection could be helpful.	Participants may find it difficult to categorize the information. They may get 'bogged down" trying to find the "right" place to place their points on the diagram.	This is a technique which builds analytical skills. Asking "why?" until you get the root cause may be difficult for some employees/trainees, especially if they are used to being spoon fed information rather than coming up with points themselves. The facilitator will have to model the technique at first - coming up with points when the participation stalls. A facilitator should not feel uncomfortable with this modelling, however, since it conforms to the best practices of adult education. Sometimes, it is useful to use an example from another context so that people do not feel threatened.

Histogram

A bar graph that shows the frequency of occurrence of events in different classes or intervals.

Major Aspects:

The histogram is probably a tool that many people have used without knowing that it is a Histogram. Think of the receptionist who keeps track of incoming phone calls by the time, day and type of call. When such information is portrayed on a bar chart it is a histogram.

There can be different patterns shown by a histogram. One of the most familiar is the well known "bell curve" that teachers have used often in the past to cluster student marks into various categories such as A, B, C, D grades.

Bedrock Skills Elements

Pro	Con	Tips
It is relatively easy to plot occurrences on one axis and classes or categories of information on another. The histogram is extremely visual - it shows patterns of variation which would be difficult to discern if presented as a table. Show trainees that variation invites measurement - numbers, time, percentages. Trainees may identify reasons why measurement of variation is useful.	The histogram requires changing the thought processes from a checklist presentation to a bar chart form. Students will need to know the advantage of doing this - i.e. - to obtain a clearer, sharper representation of specific information captured through a checklist. Students/workers with literacy difficulties may have a problem with the conceptualization process. Don't assume that all students will recognize the same information when it is presented in a different format.	Show trainees that it is not unusual to have different ways of presenting information. This is a good place to get students more familiar with learning styles. Explain how some students are more comfortable with narrative format, while others prefer a visual representation. Suggest some alternate formats which could be used to present information. Select some common everyday examples which all students can relate to before going on to some workplace specific examples. Refer to how histograms are used in other milieus, e.g., health care - tracking laboratory response time, or patient transport time.

Pareto Chart

A bar graph where the classes are sorted in order of their frequency.

Main Aspects:

This tool is used to determine if a few categories of information account for the majority of events. It will provide bar graph representation, showing the highest order of frequency to the lowest.

The tool is based on the Pareto Principle, which can be explained thusly:

"In any group of things that contribute to a common effect, a relatively few contributors account for a majority of the effect."

Bedrock Skills Elements

Pro	Con	Tips
This is a common tool. Many examples will be found in books, magazines and newspapers. Note: Vilfredo Pareto in the late 1800's observed that a relatively few citizens held the majority of wealth in the economy. Dr. Joseph Juran, the Quality guru, brought the tool into quality parlance when he observed that the mal-distribution of wealth noted by Pareto also applied to a great many other phenomena	The information is only as good as the way it is collected. If data collection is done with too few categories or too many, it will not be very instructive.	Explain that a Pareto relationship exists when there is an unequal distribution of information. If all columns in the chart are relatively equal, then this tool does not assist in removing less important ones from further consideration. Explain to trainees why it is desirable to present information in several formats - i.e. - that a checklist can result in both a histogram and a Pareto chart. Ask trainees how seeing these graphic representations helped them to understand. Ask them to think of areas of their own work that would be suitable for such graphic presentation. You might tell them of applications in other fields - such as using a Pareto diagram in a hospital to find out the reasons for late dietary trays or gaining insight into medication errors.

Run Chart

Line graph that shows how a variable changes over time

Major Aspects:

This is a time chart, showing if an event occurs most in the morning or the afternoon, and on what day of the week.

It has proved to be most useful in manufacturing settings and has often showed major problems that need attention. A run chart may be part of a machine setting, showing the evenness or otherwise of a flow. In a tape factory, for instance, a run chart's fluctuations may show that for a period of time the flow of adhesive onto the paper was uneven. It can also be done by computer or by hand.

Bedrock Skills Elements

Pro	Con	Tips
This can be an important way of identifying bottlenecks which impede the efficient operation of a process.	A run chart tells what has happened when but not why it has happened.	Use the run chart to spur analytical thinking. Encourage trainees to ask "WHY?". Explain that asking "WHY?" four or five times can lead to true insight on why an undesired effect is taking place.

Control Charts

A line graph (run chart) where some aspect of quality is plotted over time

Major Aspects:

A control chart plots some aspect of quality over time, but also plots the points to limits based on the expected value of this quantity.

It is a comparative tool, often used to track shifts in performance form previous levels.

Bedrock Skills Elements

Pro	Con	Tips
A good representation of the concept of statistical control. A good opportunity to explain the key statistical concepts of common cause variation and special cause variation.	Many trainees with basic skills needs will find a control chart very difficult to understand.	Probably this technique should not be used with a group of students/workers with low level bedrock skills. If it is considered desirable to use control charts, consider obtaining a special introductory course in statistical theory. Such a course can be revised to its most simple elements and presented in plain language format, with many step by step examples.

Scatter Charts

A plot of points where the value of two variables is shown.

Major Aspects:

This is used when exploring the relationship between two variables - e.g., temperature and humidity, or computer failure and humidity.

Scatter diagrams are particularly useful in regard to studying time in a multi-step process. They are used to analyse symptoms and causes and to design solutions. The suspected "cause" will be placed on the horizontal axis if you are showing a cause and effect relationship.

Bedrock Skills Elements

Pro	Con	Tips
Scatter charts bear a resemblance to the more familiar histogram.	It may take some experience to understand the significance of the scattered points and the extent to which they show a significant correlation.	This representation is probably best used with students/workers with a good grounding in basic skills.

Putting the Tools in Context:

I have gone on at some length about the tools used by St. Lawrence College, both in its administration and in its classrooms. The purpose has been two-fold - to show how the tools have permitted the college to analyse key processes, and to show how facilitators or instructors can use the tools to build basic skills competencies.

Here are some of the advantages that St. Lawrence College staff and administrators see as coming out of using the Statistical and Problem Solving Tools.

- a standard approach in which, once the tool is understood, everyone is providing like input which can be compared and assessed.
- a non-emotional approach to problem solving, based on seeking facts rather than on stating unsubstantiated opinions.
- an empowering atmosphere which places responsibility for problem solving with cross functional teams rather than with individuals or hierarchical work units.

As much as the tools have been a key factor in getting consistency and cohesion in St. Lawrence College's Quality efforts, they are far from the whole story. Tools in themselves cannot bring about the kind of change which Total Quality promises. In themselves, they are mechanics without an underlying purpose - a bit like trying to fix the car when you are not sure what is broken. You can imagine how aimless and unfocussed that would be.

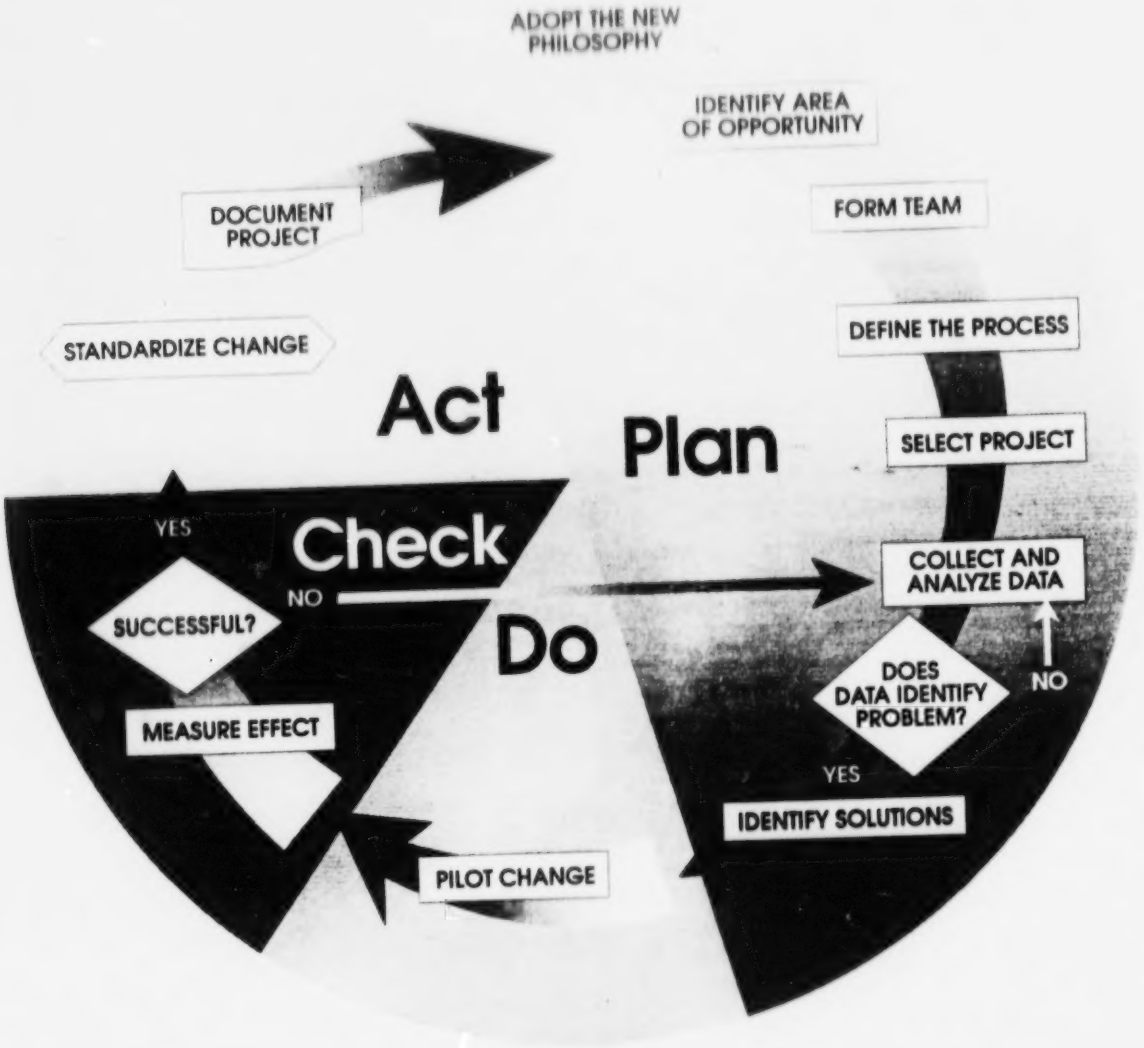
Other Success Factors:

St. Lawrence College's Quality success story is based on many elements. Here are some of them.

- commitment from the top of the organization
- a Quality coordinator who brings private sector knowledge of Quality to a public sector context
- a "training for Quality program" which is pervasive throughout the organization.
- attention to placing a great deal of knowledge about Quality into the hands of staff and students, through manuals and workshops.
- a strong focus on the Mission statement which places all Quality approaches within the context of "why we are here".
- Creative use of the PDCA Cycle - Plan, Do, Check, Act - which places problem (or opportunity) identification, data collection, and project implementation within the construct of a tried and true quality instrument.
- an emphasis on documenting process improvement and on monitoring the new process.
- emphasis on feedback to students or staff team members, and a willingness to accept ideas which have the group's stamp of approval.
- an effective way of evaluating a class or a meeting through a Plus/Delta Evaluation. **Plus** (+) refers to items that were received positively, while **Delta** (-) refers to things that could benefit from change.
- a firm grounding in the fundamentals of Total Quality/Continuous Quality Improvement as rooted in the Deming/Juran philosophy - and a willingness to move forward to investigate and evaluate related quality movements or measures which may be useful in the future, such as ISO 9000.

While many Canadian educational institutions are still in the dark ages as far as Quality is concerned, the community colleges are moving in the direction of Total Quality. They are quick to credit leadership from south of the border, where colleges have been involved with quality initiatives for a much longer time. While I chose St. Lawrence College for this study, several others come to mind a showing leadership in this field - they are Durham College in Oshawa, Ontario, and Red River College in Winnipeg, Manitoba. In all cases, a commitment to Quality has meant a sharper focus on serving the customer and greater relevance in education.

THE CONTINUOUS IMPROVEMENT CYCLE



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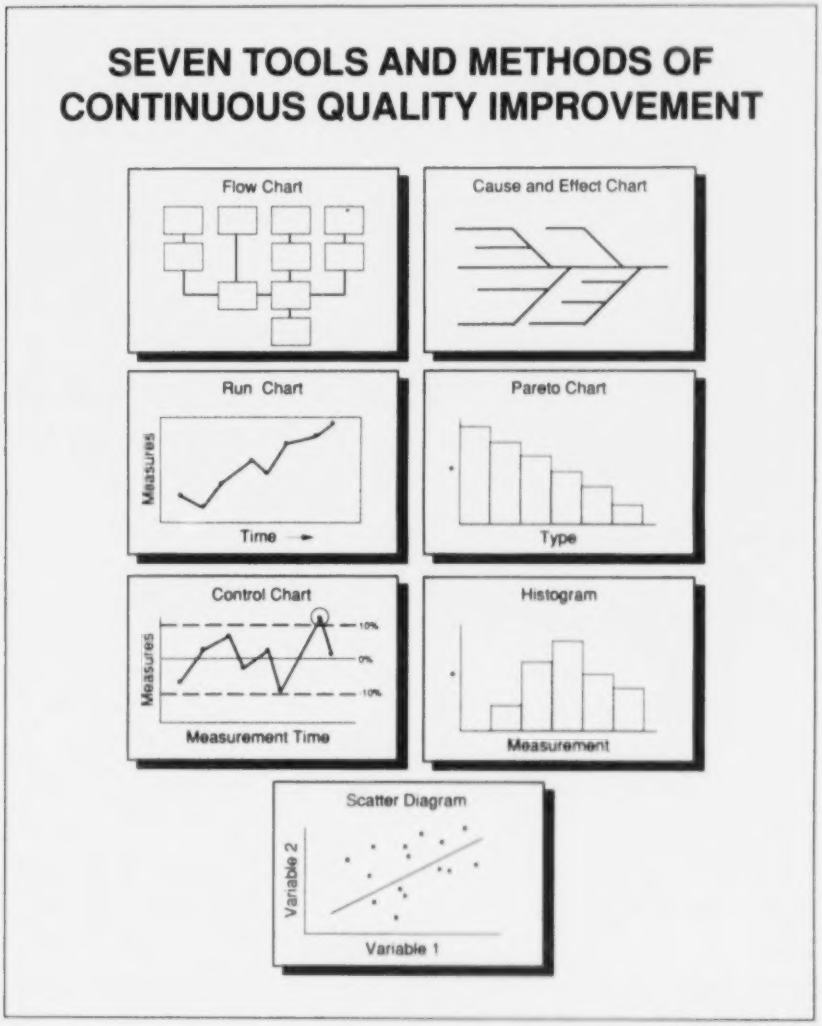
APPENDIX II

STRUCTURED JOB ANALYSIS INTERVIEW

Statistical tools are used to help staff understand processes as they are currently set up and to identify and measure the variation in processes so that improvement can be made. Commonly called the "Magnificent Seven" because of their wide application, these tools help transform complicated data into powerfully simple visual charts.



The Structured Job Analysis Interview

The Structured JobAnalysis Interview refered to in Chapter 1 appears in *Job Analysis, A Practical Guide for Managers*, Pearn, M. and Kandola, R., Institute of Personnel Management, Wimbledon, London, 1988. p.126 - 129. It was reproduced with permission of the authors in the Literacy Task Analysis Manual, a "How to Guide" for Workplace Educators, (Taylor, Lewe, 1991).

The interview format can be adapted to Total Quality workplaces by adding items from our Bedrock/Quality Toolbox (chapter 7).

The original Structured Job Analysis Interview, along with my suggested adaptations for the Total Quality workplace, is reproduced here.

Structured Job Analyis Interview	
Place in the Organization 1. What is your job title? 2. What department do you work in? 3. What jobs are immediately above yours? 4. What jobs are immediately below yours?	*Additional questions:* Are you a member of any cross-functional teams? Who are your internal and external customers?
Main Objective 5. What do you see as the main objective of your job?	How and where does your job fit in the overall process (of manufacturing, of service provision, etc.)?
Main Duties 6. (a) What are your main duties/activities? (b) How important are each of these to your work? (c) What proportion of your time do you spend on each of these duties?	How do your main duties/activities relate to the overall mission and mandate of your company/organization?
Duties and Responsibilities 7. (a) What tools and equipment do you use? (b) What do you use each of them for? (c) How important are they to your work? (d) How ofen do you use them?	

8. (a) What aspects of your work require physical effort - i.e., carrying, pushing, pulling? (b) What do you have to do? (c) What sort of weight/force/pressure is involved? (d) How often do you have to do this?	
9. (a) What written materials do you use as sources of information, e.g., notes, reports, articles, etc? (b) What do you use them for? (c) How important are they to your work? (d) How often do you use them?	Do you read flowcharts? Do you read analytical reports?
10.(a) What writing do you do - e.g., reports, letters, memos? (b) Whom do you generally write to? (c) Generally, what is the content of the written work? (d) How do you decide what you have to write? (e) How often do you have to write things?	Do you write Minutes for team meetings? Do you have responsibility for the quality of your writing?
11.(a) What materials do you use involving figures, tables of numbers, etc.? (b) What do you use them for? (c) How important are they to your work? (d) How often do you use them?	What statistical tools do you use? Do you create graphs and charts? Do you interpret graphs and charts? Do you analyse variation from "common and special cause"?
12 (a) What figure work/calculations do you have to do? (b) What do you have to do it for?	

(c) What is the highest level of arithmetic you require (e.g., working with decimals and fractions, algebra, etc. (d) How often do you work with figures?	
13. (a) Do you use graphs, pictures or pictorial materials in your work? (b) What do you use them for? (c) How important are they? (d) How often do you use them?	Do you use histograms, Pareto charts, scatter diagrams or run charts?
14. (a) Do you ever have to produce maps/charts/ diagrams, etc.? (b) For what reasons? (c) How often do you do this?	Do you produce affinity diagrams?
15. (a) Which aspects of your work,if any, require you to work accurately? (b) What would be the consequences if you were not accurate in those areas?	To what extent are you empowered to make your own decisions about work accuracy?
16. (a) What other sources of information do you use in your work? (b) For what reason? (c) How important are they?	
17. (a) Are professional qualifications required to perform this job? (b) What level of education is needed to be able to perform this work?	

18.(a) Is previous experience required to perform this job? (b) If yes, what sort of experience is required. Be as specific as you can. (c) Why do you think that? (d) What is the minimum amount of time in which a person could have obtained such experience?	
19. (a) How much supervision do you receive? (b) How much contact do you have with your supervisor? (c) How does your supervisor know if your work is up to standard?	
20. (a) How many people do you supervise? (b) What does that involve?	Do you have a formal or informal supervisory role?
21.(a) How do you decide the order in which to carry out your work? (i.e., is it predetermined or are you free to set your own priorities?)	To what extent are your priorities affected by the processes in which upstream and downstream customers are involved?
22. (a) What planning or organizing do you have to do? (b) What do you have to do it for? (c) How important is it to your work? (d) How often do you have to do it?	Is planning and organiing individual or team based?
23.(a) How responsible are you for the safety of others? (b) What does this involve? (c) How important is this?	

24.(a)	What sorts of assts, material, mony are you directly responsible for?	
(b)	What does this involve?	
(c)	How important is this?	
Contact with Others		What mechanisms are in place to allow you to give suggestions to senior management?
25.(a)	What people do you come into contact with in the organization?	Do you have an ongoing conduit to senior managers?
(b)	For what reason?	
(c)	How important is contact with each of these people?	
(d)	How often do you come into contact with each of these people?	
26.(a)	What people from outside the oranization do you come into contact with?	
(b)	For what reason?	
(c)	How important is contact with each of these people?	
(d)	How often do you come into contact with each of these people?	
27.(a)	Is there any negotiating/interviewing/ training/public speaking involved?	Are you expected to and encouraged to speak up at group meetings and problem solving sessions?
(b)	For what reason?	
(c)	What does it involve?	
(d)	How important is it?	
(e)	How often do you have to do it?	

28.(a) What are the major forms of contact (e.g., personal contact, telephone, letters, memos, etc.)? (b) How important are these forms of contact? (c) How often do you use them?	
Physical Environment 29.(a) Is the majority of your work indoors or outdoors? (b) What proportion of time is spent indoors/outdoors?	
30.(a) How many people do you work with most of the time?	
31(a) What are the physical conditions like (e.g., light, heat, space, etc.)?	
32.(a) To what extent do routines and procedures have to be followed? (b) For which activities? (c) How much time do you spend working under such routines and procedures?	Do you have input into determining the content and scope of procedures? Do you write up quality procedures for an ISO manual?
33.(a) What are the prospects for future development?	Do you formally participate in career development goal setting? Do you consider both personal and organizational goals? Is a formal training plan crafted for you in light of your career development goals?

NOTES

SOME COMMENTS ON QUICKSANDS!

"I enjoyed the read. For me, it helped pull CQI, TQM, ISO 9000 and integrated learning together in one place for consideration. "

Jim Lippert
Executive Director
SkillPlan, BC Constructon Industry Skills Improvement Council

"*Quicksands* integrates solid theory with illuminating examples. The marrying of basic - or bedrock - skills development and quality techniques is most apt for health care, especially for support workers who often need upgrading of basic literacy skills.

Keith Christopher, PhD
Quality and Management Consultant
Health Care Sector

"It is an excellent resource for anyone who trains, or is considering training, in a total quality workplace."

Julian Evetts
Basic Skills Instructor and Consultant
Calgary Herald Learning Centre

"Most major management philosophies fail because lower levels in the organization don't "buy in". In a surprising number of cases, it's because they can't read or write adequately. This book shows what to do about it."

Dr. Hawley Black, author of "How to Sell to Government"